TM 11-6625-2611-12

TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

TEST SET, TRANSPONDER SET
AN/APM-305A

HEADQUARTERS, DEPARTMENT OF THE ARMY

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual describes Test Set, Transponder Set AN/APM-305A (test set) (fig. 1-1) and covers its operation and organizational maintenance. It includes instructions for installation, operation, inspection, self-testing, and preventive maintenance of the equipment. Also included in this manual is a maintenance allocation chart (app D).

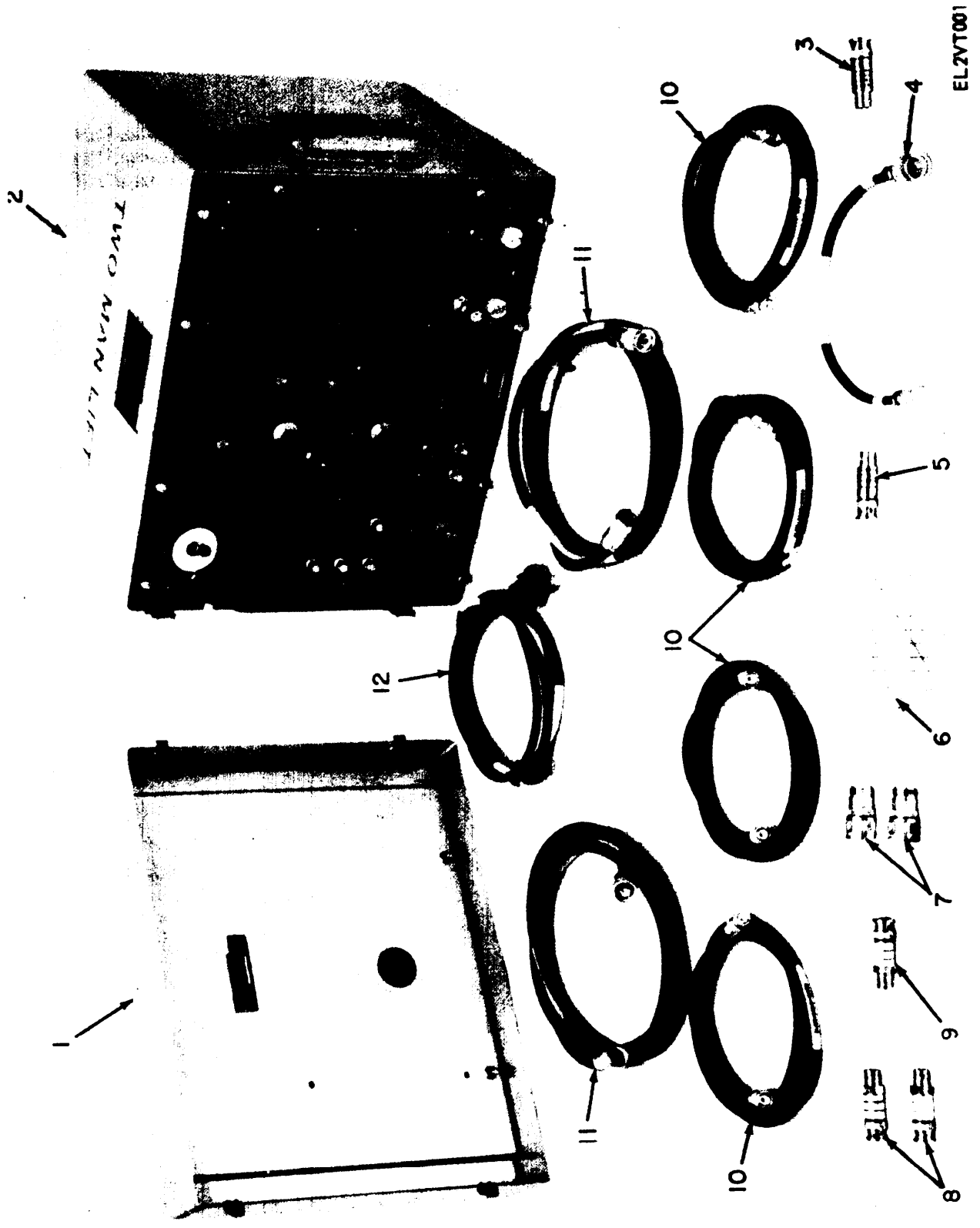

Figure 1-1. Test Set, Transponder Set AN/APM-305A

1 Cover Assy Test Set MX-9944/APM305A (152050)
2 Test Set Transponder TS-3395 A/APM305 (152100)
3 Attenuator, 30 dB (134645-2)
4 Cable Assy, RF (Jumper) (139528)
5 Attenuator, 15 dB (134645-1)
6 Chart, Conversion RF (151944-1)
7 Adapter C (male) to N (female) (UG-565 A/U)
8 Termination, Feedthru, 75 ohm (134646-1)
9 Termination Feedthru, 93 ohm (134646-2)
10 Cable Assy, Video (139527)
11 Cable Assy, RF (139526)
12 Cable Assy, Power, AC (139529)

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO'S) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DLAR 4145.8.

c. *Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO P4610.19C and DLAR 4500.15.

1-4. Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-90-1.

1-5. Destruction of Army Electronics Materiel

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-6. Calibration

Pertinent publications on calibration of this equipment is referenced in TM 11-6625-2611-35.

1-7. Reporting Equipment Improvement Recommendations (EIR)

EIR's will be prepared using DA Form 2407, (Maintenance Request). Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System. EIR's should be mailed direct to US Army Communications and Electronics Materiel Readiness Command, ATTN. DRSEL-MA-Q, Fort Monmouth, New Jersey 07703. A reply will be furnished direct to you.

Section II. DESCRIPTION AND DATA

1-8. Purpose and Use

The test set is a bench test set which when used with an oscilloscope and Test Set, Transponder Set AN/APM-239 provides field personnel with the capability to check, maintain, align and calibrate transponder sets which meet the requirements of DOD-AIMS 65-1000. The test set generates IFF interrogations and transmits these signals at adjustable rf power levels and adjustable prf to the transponder under test. Two separate variable rf outputs are provided to test diversity type transponders, or the two rf paths can be combined to test transponder ISLS characteristics over the complete dynamic range of the transponder. The rf reply from the transponder is demodulated and can be analyzed for proper frequency, power level, coding, pulse shape and pulse train spacing. Mode 4 operation, including disparity conditions, can be simulated. Facilities are included to test the selectivity of the transponder received and suppression pulse circuits; and supply crystal controlled markers to the oscilloscope. A self-test feature permits isolation of failures to a printed circuit card and/or module level using only the test set indicators and test points.

1-9. Description

The test set generates the necessary signals to test transponder sets and converts rf signals generated by the transponder set into video signals which are applied to the oscilloscope for display. The test set consists of the items listed in paragraph 1-12. All items of the test set are described in the following subparagraphs.

a. Test Set, Transponder TS-3395A/APM-305. TS-3395A/APM-305 contains all the active circuits of the test set. All circuits and their related components are mounted on a common chassis, which is enclosed in a dust cover. All connectors, controls, indicators, and 1.0 ampere fuse are located on the front panel. All controls are directly calibrated. Two vertically positioned handles, which act as guardrails, are located at the extreme ends of the front panel. As indicator lamp indicates that the test set is energized. A second indicator indicates when the power supply fails. A meter is provided with dual calibration to measure rf peak power and prf. The weight and overall dimensions of the test set are listed in paragraph 1-12.

b. Test Set Cover MX-99441APM-305A. Test Set Cover MX-9944/APM-305A (front panel cover) attaches to the front panel of the test set to protect it when not in use. All accessories are within the front panel cover. The front panel cover attaches to the test set by four latches.

c. *Power Cable Assembly.* The three-conductor power cable assembly connects the test set to a 115 vac primary power source. One end of power cable assembly has an MS3016E1OSL-3S connector. This connector is to be connected to the test set POWER connector. The other end of power cable assembly has a UP-131M connector connected to the primary power source. The ground pin of the connector is spring-loaded to the in-

use position. Normally, the ground pin is connected to power ground. However, if the ground system of the transponder under test is other than the power ground, the ground pin is pivoted to the not-in-use position when the plug is inserted into the power receptacle. The overall length and weight of power cable assembly are listed in paragraph 1-12.

d. Adapters. Two Adapters UG-565A/U are provided as a means of mating the rf cable assembly to transponders with female type C rf connectors, such as UG-571/U. The overall dimensions and weight of Adapter UG-565A/U are listed in paragraph 1-12.

e. *Rf Cable Assembly, 12 Inch (50.48CM).* The rf cable assembly is used to connect the test set RF IN/OUT jacks to the LOW PWR IN jack during self-checks. The type of cable used is RG-223/U. One end of the rf cable assembly has a male type BNC (UG-88/U) connector. This end of rf cable assembly mates with the test set LOW PWR IN jack. The other end of the rf cable assembly has a male type N connector which mates with either test set RF IN/OUT jack. The overall length and weight of rf cable assembly are listed in paragraph 1-12.

f. Video Cable Assemblies, 60 Inch (152.4 CM). Four video cable assemblies are provided to interconnect the test set to the oscilloscope. Video cable assemblies are constructed of RG-62A/U cable. Each end of the cable assemblies has a male type BNC (UG-88/U) connector. The overall length and weight of the video cable assemblies are listed in paragraph 1-12.

g. Rf Cable Assemblies, 96.0 Inch (243.84 CM). Two rf cable assemblies are provided to interconnect the test set RF IN/OUT jacks to the transponder rf jacks. Each cable is made of a calibrated length of RG-212/U. The attenuation of the rf cable assembly is marked on the cable (usually 0.9 db) for either 1030 MHz or 1090 MHz which must be added to the test set attenuator setting when determining the output signal of the test set. The attenuation must also be considered when measuring the rf output power of the transponder set under test. Each end of rf cable assembly has a male type N connector for mating with a female type N connector such as UG-19B/U. The overall length and weight of the rf cable assembly are listed in paragraph 1-12.

h. 15 *and 30 Db Attenuators.* The attenuators are used to extend the input power capability of the test set LOW PWR IN jack to a range between +3 dbm and +48 dbm. Each attenuator is individually calibrated with the actual attenuation marked on the side. One end of the attenuator has a male type BNC connector which mates with the test set LOW PWR IN jack. The other end of the attenuator has a female type BNC connector which mates with a UG-88/U connector attached to an rf cable. The overall dimensions and weight of the attenuators are listed in paragraph 1-12.

L Conversion Chart The conversion chart is used to convert test set power meter indications in dbw into power inputs in KW. Meter indications are read on the bottom of the chart and power is read along the side. The dimensions of the calibration chart are listed in paragraph 1-12.

j. *Video Terminations.* Three feedthrough-type terminations are provided, each with a connector on one end to mate with a UG-912/U and a connector on the other end to mate with a UG-260/U. The dc resistance of two of the terminations is 75 ohms and the remaining termination is 93 ohms. The 75-ohm terminations (MX-554 A/U) provide proper termination of demodulated and reply marker test set outputs. The 93-ohm termination (MX-554 A/U) provides proper termination of mode 4 reply output.

1-10. Tabulated Data

Parameter	Description
Internal PRF:	10 to 10,000 pps for SIF
Reduced PRF:	5 to 5,500 pps
RF Sweep PRF:	250 Hz and 800 Hz, ±10 percent
Scope Trigger Output	5±1V, positive, 3 ±2 µ sec,100 ohms, 0.5 to 4000 µ sec variable delay
Auxiliary Trigger Output:	20 ± 3V, positive, 1 ± 0.5 µ see, 90 ohms
Codes:	1, 2, 3/A, C, Test, Mode 4 words A and B
Challenge Pulse Spacing	Nominal, ±0.2, ±0.9 µ sec (±0.05 µ sec) and Variable ±1µsec
Mode 4 Pulse Spacing (2nd 3rd, and 4th sync pulses):	Nominal, ±0.2, ±0.9 µsec (±0.05 µ see) and Variable ±1 µsec
Challenge Pulse Width:	0.25, 0.5, 0.8, 1.7 µ sec (±0.05 µ sec) and Variable from 0.25 to 1.7 µ sec
ILSL Pulse Spacing	Nominal, ±0.15, ±0.6 µ sec (±0.05 µ see) and Variable ±1µsec
Suppression Pulse Output:	20 ± 2 V, positive, 30 ±3 µ sec, 2200 ohms, <50 picofarad
Mode 4 Enable Trigger Input	1.5 to 5 V, positive, 0.5 to 3 µ sec, 90 ohms
Mode 4 Challenge Video Input	1.5 to 5V, positive, 0.4 to 0.6 µ see, 90 ohms
Mode 4 Reply Output:	5 ±0.5V, positive, 0.5 ±0.1 µ sec, 3 pulses spaced 1.8 ±0.1 µ sec, 90 ohms, 200 µ sec after fourth sync pulse
Mode 4 Disparity Output:	5 ±0.5V, positive, 0.5 ±0.1 µ sec, 90 ohms, 65 ±1 µ sec after enable trigger or coincident with the pulse at 66 µ sec for Mode 4 (word A and B) Disparity
SIF Markers:	0, 20.30, 24.65 and 49.30 µ sec (±0.02 µ sec), Variable from 2 to 4 µ sec after P3; > .5V positive, 0.15 ±0.05 µ sec, 75 ohms
Timing Markers	0.1, 1.0, and 10.0 µ sec ±.02%,

Parameter	Description
	>05 volts 75 ohms
Signal Generator Fixed Frequency Output:	1030 MHz ±0.01 percent
Signal Generator Swept Frequency Output:	1025 to 1035 MHz or 1010 to 1050 MHz
Swept Frequency Markers:	1025, 1027, 1029, 1030, 1031, 1033, 1035 MHz ±0.1 MHz and 1010, 1050 MHz ±0.3 MHz
RF Power Output (Main or Aux)	-10 to -90 dbm ±1.0 db
Fixed Frequency with pulse width of 0.5 to 0.8 µ sec	-10 to -90 dbm ±1.0 db
Operation Limitations:	
Temperature	0°c to +55°C
Altitude	0 to 10,000 feet (3048 meters) above sea level
ISLS Output Level:	Variable from 0 to -70 dB from Main RF output (-90 dbm minimum)
RF Input (Main or Aux)	63 W to 2.0 KW Peak 14W avg., VSWR less than 1.35:1 within 50 ohm load
Demodulated Video:	> 1V for +18 to 33 dBw, with less than 20 µ sec distortion, 1085 to 1095 MHz
Power Measurement (Main or Aux)	+18 dBw to + 33 dBw ± dB
Low Power Measurement:	-12 dBm to +3 dBm ±1 dB
Frequency Measurement:	±0.6 MHz accuracy, 1070.0 MHz to 1086.9 MHz, and 1093.1 MHz to 1110.0 MHz, ± 0.2 MHz, 1087.0 MHz to 1093.0 MHz
PRF Measurement (Demodulated Replies or Internal Trigger)	5 to 10.000 Hz
Meter	Reads PRF in Hz and Power in dBw
Input Power	103.5 to 126.5 vat, 45 to 66 Hz or 380 to 420 Hz, 70 Watts

1-11. Items Comprising an Operable Equipment

The items of the test set required for operation are listed below.

Qty	NSN	Item	Dimensions(in.)(cm) Height	Width	Depth	Weight(lb)(gr)
1		Test Set, Transponder TS-3395A/APM-305A	13.98 (35.50CM)	18.0 (45.72cm)	15.5 (39.37cm)	54 (24.3 kg)
		NOTE Following items are stored inside test set cover.				
2	5935-00-665-6543	Adapter, Connector UG-565A/U	1.375 lb (3.49CM)	0.75 dia (1.9cm)		0.125 (56.7 gr)
1		15 db attenuator (45413-134645-1)	1.9375 lg (4.92CM)	0.5625 dia (1.42cm)		0.62 (281.23 gr)
1		30 db Attenuator (TE 134645-2)	1.9375 lb (4.92cm)	0.5625 dia (1.42cm)		0.62 (281:23 gr)
1		Cable assembly, power (45413-139529)	96.0 lg (243.84cm)			0.30 (136.08 gr)
1		Cable assembly, rf (45413-139528)	12.0 }g (30.48cm)			0.125 (56.7 gr)
4		Cable assembly, video (45413-139527)	60.0 lg (152.4cm)			0.25 (113.4 gr)
2		Cable assembly, rf (45413-139526)	96.0 lg (243.84cm)			0.95 (430.92 gr)
1		Conversion chart (45419-151944-1)	5.50 lg (13.97cm)	4.50 (11.43cm)		0.01 (4.536 gr)
2		Termination feedthru 750 (134646-1)				0.30 (136.08 gr)
1		Termination feedthru 93 Ω (134646-2)				0.30 (136.08 gr)
1		Cover, Test Set Mx-9944/APM-305A (152060)	4.01 (10.18cm)	17.19 (43.66cm)	13.5 (34.29cm)	5.0 (2.27 kg)

CHAPTER 2
SERVICE UPON RECEIPT AND INSTALLATION

Section I. SERVICE UPON RECEIPT OF MATERIAL

2-1. Siting

The installation site shall have conditions which meet the operating limitations characteristics described in paragraph 1-11.

2-2. Unpacking

When packed for shipment, the test set is placed in a corrugated box. A typical shipping box and its contents are shown in figure 2-1. The outer corrugated box is 29 inches (73.66 cm) high, 18 3/4 inches (47.62 cm) deep, and 25 1/4 inches (64.13 cm) wide; the volume is 7.95 cubic feet (.225 cu meter). The gross weight of the carton is 5 pounds (2.26 kg). Store shipping container and packing material for future use.

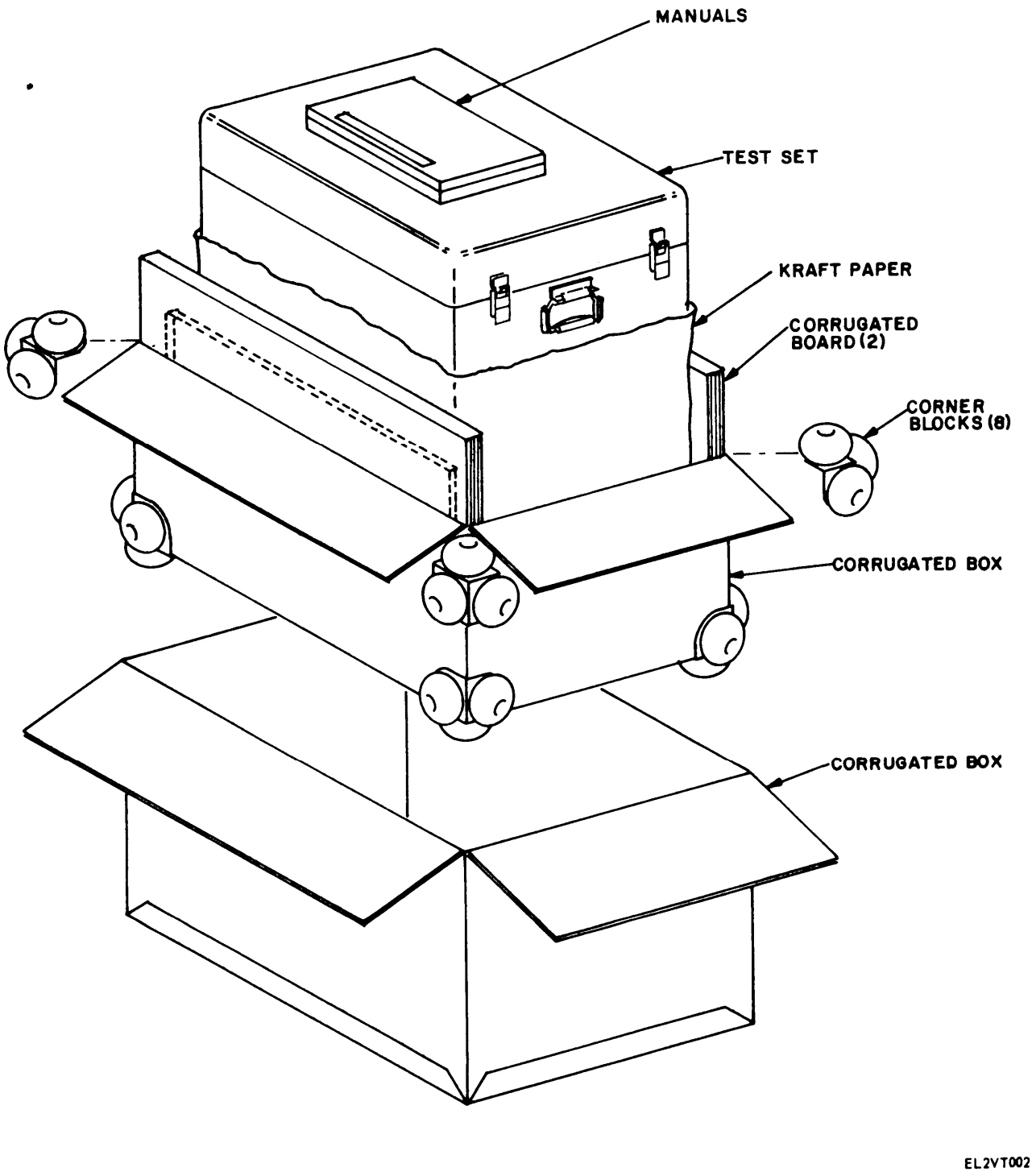

Figure 2-1. Packaging diagram

2-3. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 1-3).

b. Check the equipment against the component listing and the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions in TM 38-750. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

c. Check to see whether the equipment has km modified. Equipment which has been modified will have the MWO number on the front panel, near the nomenclature plate. Check also to see whether all currently applicable MWO'S have been applied. Current MWO applicable to the equipment are listed in DA – Pam 310-7.

Section IL INSTALLATION INSTRUCTIONS

2-4. Tools, Test Equipment, and Materials Required for Installation

An oscilloscope only is required for installation, to view output wave forms of test set.

2-5. Assembly of Equipment

The test set is shipped assembled and ready for operation.

2-6. Installation Procedures

Place test set so that no forced-air cooling from other equipment is directed on the sides of the test set. Do not place other equipment within 1 inch of either side of the test set to allow for adequate cooling.

2-7. Interconnections

Remove the front panel cover. The front panel cover is secured to the test set by four latches, two on each side. Remove the power cable from the front panel cover. Be sure front panel POWER switch is OFF. Connect the power cable between POWER connector and power source (115 VAC, 45 to 66 or 380 to 420 Hz).

Section Ill. PRELIMINARY ADJUSTMENT OF EQUIPMENT

2-8. Operator's Controls, Indicators, and Connectors

Table 3-1 identifies and describes the functions of controls, indicators, and connectors of the test set. Figure 3-1 shows all controls, indicators, and connectors.

2-9. Typical Bench Test Setup

A typical bench test setup for making the following transponder measurements is shown in figure 2-2.

a. Diversity characteristics
b. Receiver bandwidth and center frequency
c. Minimum triggering level at normal and low sensitivity
d. Duty cycle limit
e. Reply rate limit
f. Mode 4 rate limit
g. Internal suppression-decode
h Internal suppression~external
L ISLS recognition
j. Decoder characteristics
k. Pulse width discrimination
l. Transmitter output frequency
m. Transmitter output power
n. Transmitter output pulse shape
0. Transponder delay
P. Transponder jitter
q. Reply code spacing and coding
r. I/P reply characteristics
s. Emergency reply characteristics
t. Auxiliary trigger operation
u. Mode C operation
v. Mode 4 reply characteristics
w. Disparity action
x. Mode 4 enable trigger output
y. Mode 4 video output
z. Mode 4 audio output
aa. Mode 4 challenge video output
ab. Mode 4 reply light enable
ac. Mode 4 caution light enable
ad. Random triggering rate
ae. External suppression output

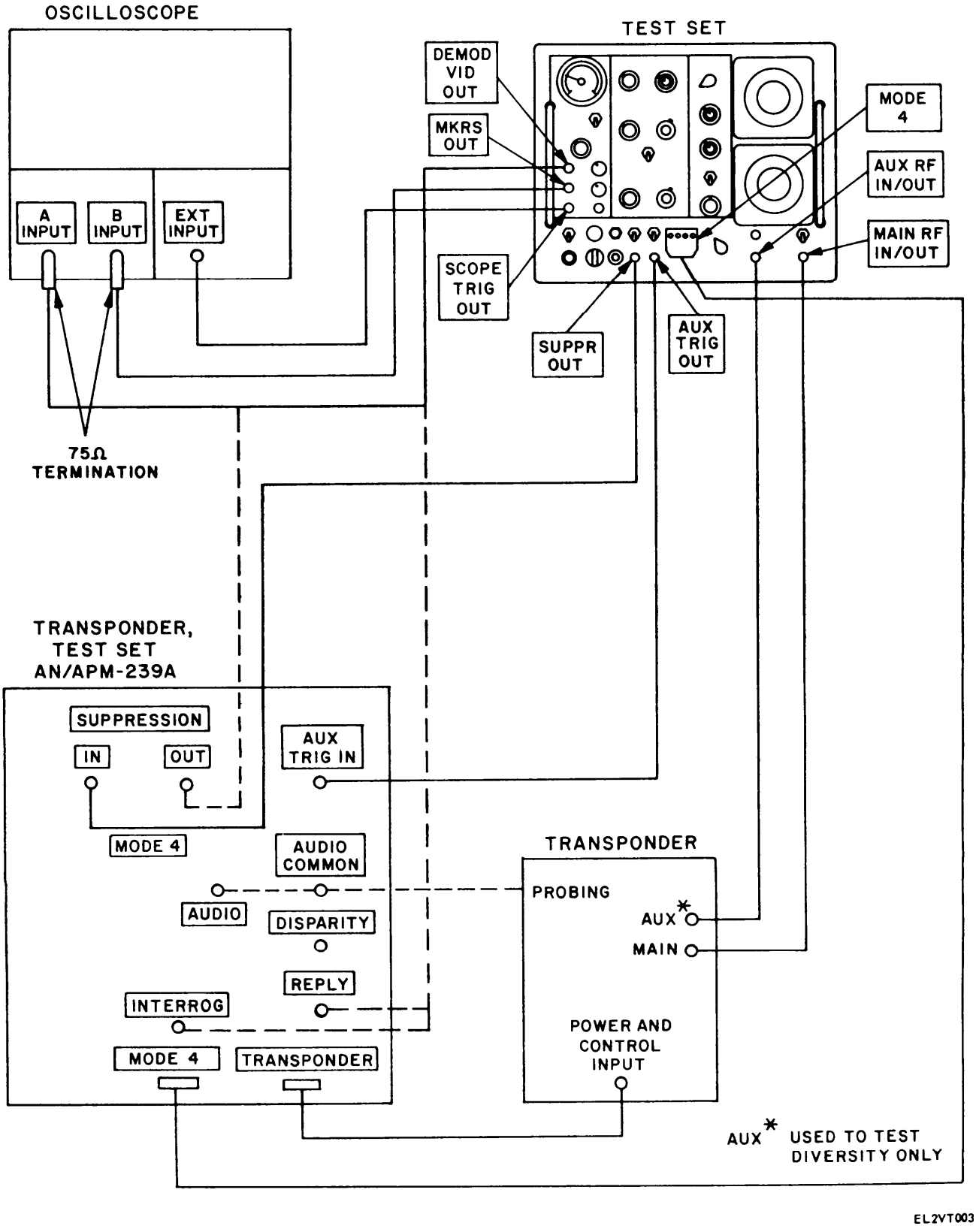

Figure 2-2. Typical bench test setup.

2-10. Additional Test Capabilities

In addition to performing the measurements listed in paragraph 2-9, the test set can be used in a number of test setup configurations to test other transponder capabilities which include, but are not limited to, the following

a. AOC reaction time
b. Internal suppression-ISLS
c. Preselector alignment
d. Echo suppression
e. ISLS gate characteristics
f. ISLS rate limit

Section IV. CIRCUIT ALIGNMENT

2-11. Introduction

This section contains the operator's checklist to determine the operational status of the test set. Refer to table 2-4 for the checklist.

2-12. General Information

a. Use of Table. The operator's checklist is a step-by-step test procedure and should be performed in the order given. The *Control settings* column specifies the settings of the equipment to be changed for the specific measurement. The *Test procedure* column refers to the applicable test setup and provides specific parameters to be measured. The *Performance standard* column specifies the results that should be observed. In all steps, except steps 1 and 2, if the results specified are not obtained, higher category maintenance is required. If the results specified for steps 1 and 2 are not obtained, refer to troubleshooting procedures in chapter 4. Waveforms are shown in figure 4-1.

b. Additional Equipment Required. The oscilloscope is required to perform the operator's checklist procedures.

c. Oscilloscope Preparation *for Use.* To prepare the oscilloscope for use, connect the power lead to 115 vac power source. Make a connection between ground on the oscilloscope and GND on the test set. Position controls as indicated in table 2-2.

d. Test Set Preparation for Use. To prepare the test set for use, connect the power lead to 115 vac power source. Connect the oscilloscope to the test set as shown in figure 2-3. Set the remaining test set controls as shown in table 2-3.

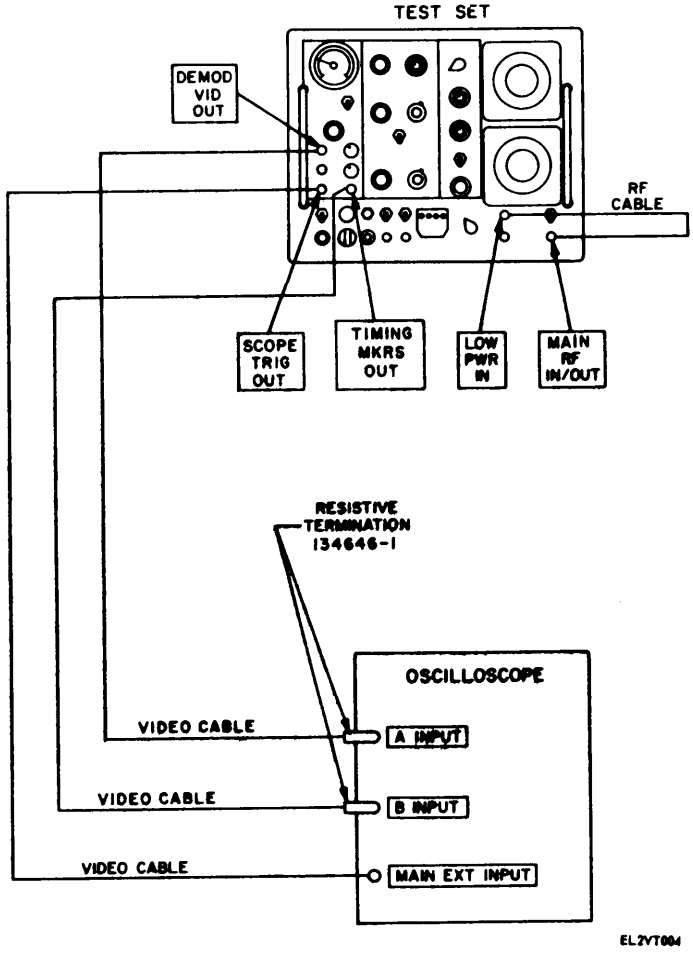

Figure 2-3. Test set operator'8 checklist test setup

Table 2-2. Oscilloscope Control Settings

Controls	Setting
POWER (switch)	ON (applies ac power to oscilloscope)
HORIZONTAL POSITION	Adjust horizontal position for best display
HORIZONTAL MAGNIFIER	X1
DISPLAY	ALT
A and B VOLTS/DIV	1
MAGNIFIER	X1
MAIN TRIGGER LEVEL	0
EXT + 10/ EXT/INT/LINE	EXT
MAIN TIME/DIV	10 µ sec
SWEEP DISPLAY SWITCH	MAIN
SWEEP MODE	AUTO
DIV DELAY	0.00

Table 2-3. Test Set Preliminary Control Settings

Controls	Settings
POWER ON/OFF switch	ON
CHAL SUB PULSE SELECT switch	SIFP1
CHAL SUB PULSE POSITION SELECT switch	0
CHAL SUB PULSE POSITION VARY control	Midrange
CHAL MODE SELECT switch	c
CHAL WIDTH SELECT switch	0.80

Table 2-3. Tent Set Preliminary Control Settings (Continued)

Controls	Settings
CHAL WIDTH VARY control	Midrange
CHAL ISIS SPACING SELECT switch	0
CHAL ISLS SPACING VARY control	Midrange
CHAL INHIBIT switch	OFF
CHAL AUX MOD DLY control	Fully counterclockwise
MEASUREMENT PRF RANGE switch	X1K
MEASUREMENT FUNCTION SELECT switch	PRF CHAL
MEASUREMENT DEMOD VIDEO LEVEL control	Midrange
MEASUREMENT MKR PHASING control	Midrange
PRF SELECT RANGE switch	X1K
PRF SELECT MU LT control	5.0
PRF SELECT switch	X1
SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch	OFF
SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control	1.0
SUPPR switch	ON
AUX TRIG switch	ON
MAIN ATTEN control	-10
AUX ATTEN control	-10
RF IN/OUT DEMOD switch	MAIN
SIG GEN FCTN switch	FIXED FREQ

Table 2-4. Operator's Checklist

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
			Power Supply Test	
1	Set up oscillscope as described in paragraph 2-11*c* and table 2-2.	Set up test as described in paragraph 2-11*d* and table 2-3.	*a.* Check POWER indicator	*a.* POWER indicator lights.
			b. Check POWER DC FAULT indicator.	*b.* POWER DC FAULT indicator is not lighted.
2			Press POWER DC FAULT indicator.	POWER DE FAULT indicator lights.
			Prf Generator and Prf Measurement Test	
3			Observe MEASUREMENT meter.	MEASUREMENT meter indicates 4500 to 5500 Hz.
			Timing Marker Test	
4	DISPLAY switch B B VOLTS/DIV 1 MAIN TIME/DIV 5 μsec.	Set up test set as described in paragraph 2-11*d*.	Observe three sets of markers. Each set will be of different amplitude and spacing.	Three amplitude levels of markers are present.
5	DELAYED TIME/DIV switch 0.1 μsec Sweep display switch DELAY		Using time differential measurement procedure described in paragraph 4-9*d*, measure spacing between leading edge of the first lower amplitude set of pulses.	Pulses are spaced 0.1 μsec $\pm$0.02%, $\geq$0.5 volt amplitude.
6	DELAYED TIME/DIV switch 0.2 μsec B VOLTS/DIV .5		Observe second set of pulses (Amplitude level more than previous pulses but less than the third set of pulses.)	Pulses are spaced 1.0 μsec $\pm$0.02%, $\geq$0.5 volt amplitude.
7	DELAYED TIME/DIV 2.0 μsec		Observe third set of pulses with first, and second set within.	Pulses are spaced 10.0 μsec $\pm$0.02%, $\geq$0.5 volt amplitude.
			SIF Challenge Test	
8	Sweep display switch DELAYED Adjust DIV DELAY control to view pulses on A INPUT DISPLAY switch ALT A VOLTS/DIV .5		Measure spacing of pulses on A INPUT using TIMING MKRS as a reference on B INPUT. (Uncalibrate VERNIER to view pulses. Restore to CAL position after step completion.)	Pulses are spaced 21.0 $\pm$0.5 μsec.
9	Sweep delay switch MAIN	Remove cable from TIMING MKRS OUT jack to MKRS OUT jack.	*a.* Observe spacing between second pulse on A INPUT and first marker on B INPUT, while varying setting of MEASUREMENT MKR PHASING control.	*a.* Spacing varies with setting of MEASUREMENT MKR PHASING control.
			b. Observe markers on B INPUT.	*b.* Four markers appear representing 0, 20.30, 24.65, and 49.30 μsec.
10		CHAL MODE SELECT switch 1	Observe oscilloscope.	Two pulses appear on A INPUT and SIF markers remain on B INPUT.
11		CHAL MODE SELECT switch 2	Observe oscilloscope.	Two pulses appear on A INPUT and SIF markers remain on B INPUT.
12		CHAL MODE SELECT switch C	Observe oscilloscope.	Two pulses appear on A INPUT and SIF markers remain on B INPUT.
13		CHAL MODE SELECT switch 3/A	Observe oscilloscope.	Two pulses appear on A INPUT and SIF markers remain on B INPUT.
14		CHAL MODE SELECT switch TEST	Observe oscilloscope.	Two pulses appear on A INPUT and SIF markers remain on B INPUT.
			Mode 4 Test	
15	DISPLAY switch A	CHAL MODE SELECT switch 4A	*a* Observe oscilloscope.	*a.* 28 pulses appear on A INPUT.
		PRF SELECT switch to X 1/2	*b.* Observe MEASUREMENT meter.	*b.* MEASUREMENT meter indicates 2250 to 2750 Hz.
16	MAIN TIME/DIV switch 50 μsec DISPLAY switch ALT B VOLTS/DIV 5.		Disconnect cable from oscilloscope B INPUT. Connect oscilloscope probe between B INPUT and MODE 4 connector, pin 1. Press and hold BIT (MOM) switch while	Mode 4 reply appears on B INPUT delayed from mode 4 challenge on A INPUT.

Table 2-4. Operator's Checklist—Continued

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
			observing oscilloscope display.	
17	MAIN TIME/DIV switch 10 μsec A VOLTS/DIV 1.		Connect oscilloscope probe from oscilloscope B INPUT to MODE 4 connector, pin 4. Press and hold CHAL INHIB switch to DISPARITY (MOM). Observe oscilloscope display.	Twenty-sixth pulse (66 μsec) is inhibited on A INPUT and pulse appears on B INPUT.
18		CHAL INHIB switch ISLS ON	Observe oscilloscope A INPUT.	Pulse appears in fifth (ISLS) pulse position of challenge on A INPUT.
19			Press and hold BIT (MOM) switch.	Pulse appears on B INPUT coincident with last pulse of challenge on A INPUT.
			Rf Test	
20	A INPUT VOLTS/DIV switch .5	MEASUREMENT FUNCTION SELECT switch PWR CHAL INHIB switch OFF	Adjust MEASUREMENT DEMOD VIDEO LEVEL control until pulses on A INPUT are 1.0 volt in amplitude. Observe MEASUREMENT meter.	MEASUREMENT meter indicates 19.0 to 21.0 dbw.
21			Disconnect cable from RF IN/OUT MAIN jack and connect to RF IN/OUT AUX jack. Adjust MEASUREMENT DEMOD VIDEO LEVEL control until pulses on A INPUT are 1.0 volt in amplitude. Observe MEASUREMENT meter.	MEASUREMENT meter indicates 19.0 to 21.0 dbw.
22	MAIN TIME/DIV switch .1 MSEC B INPUT VOLTS/DIV 5.0 DISPLAY B.	SIG GEN FCTN switch SWP ±5 MHZ Remove cable from AUX RF IN/OUT connect to MAIN RF IN/OUT jack.	Disconnect oscilloscope probe from oscilloscope B INPUT and test set MODE 4 connector. Connect cable between oscilloscope B INPUT and MEASUREMENT MKRS OUT jack (no termination). Observe oscilloscope.	Seven markers appear on B INPUT.
23	A VOLTS/DIV switch 2	MEASUREMENT FUNCTION SELECT switch: FREQ	Press and hold BIT(MOM). Measure frequency of signal on A INPUT interpolating between markers on B INPUT.	Frequency is 1090.0 ± .3 MHz.
24	MAIN TIME/DIV switch .5 MSEC DELAYED TIME/DIV switch .2 MSEC Sweep display switch DELAYED	SIG GEN FCTN switch SWP ±20 MHZ	Adjust oscilloscope DIV DELAY to view one complete set of markers on B INPUT. **NOTE** If necessary, adjust DELAYED VERNIER control.	Nine markers appear.
			Dual 3/A and Delay Test	
25	A INPUTS VOLTS/DIV switch .5 Sweep display switch MAIN DELAYED TIME/DIV switch OFF	SIG GEN FCTN switch FIXED FREQ SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X40 CHAL MODE SELECT switch DUAL 3/A MEASUREMENT FUNCTION SELECT switch PRF CHAL	Disconnect cable from test set MEASUREMENT SCOPE TRIG OUT jack and connect to AUX TRIG OUT jack. Observe oscilloscope while adjusting SCOPE/TRIG FREQ MEAS (USEC) MULT control.	Two challenges are displayed with spacing between varied by adjusting control.
	MAIN TIME/DIV switch 50 μSEC DISPLAY switch A	PRF SELECT RANGE switch X100		

Table 2-4. Operator's Checklist—Continued

Step No.	Control Settings		Test procedure	Performance standard
	Oscilloscope	Test set		
		Suppression Trigger Test		
26	MAIN TIME DIV switch 5 μSEC B INPUT VOLTS DIV switch 10 DISPLAY switch B	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch OFF PRF SELECT RANGE switch to X1K	Disconnect cable from test set MEASUREMENT MKRS OUT jack and connect to SUPPR OUT jack. Disconnect cable from AUX TRIG OUT jack and reconnect to MEASUREMENT SCOPE TRIG OUT jack. Observe oscilloscope.	Pulse is 20 $\pm$2 volts in amplitude and 30 $\pm$3 μsec in duration.

CHAPTER 3
OPERATING INSTRUCTIONS

Section I. CONTROLS AND INSTRUMENTS

3-1. Damage From Improper Settings

There are no control settings or combination of control settings which will damage the equipment or create a hazard to personnel.

3-2. Operator's Controls

Table 3-1 identifies and describes the function of controls, indicators, and connectors of the test set. Figure 3-1 illustrates and locates all controls, indicators, and connectors. Because of various transponder configurations, specific operating procedures for this test set are not contained in this manual. Test procedures for a specific transponder set are found in its associated maintenance manual.

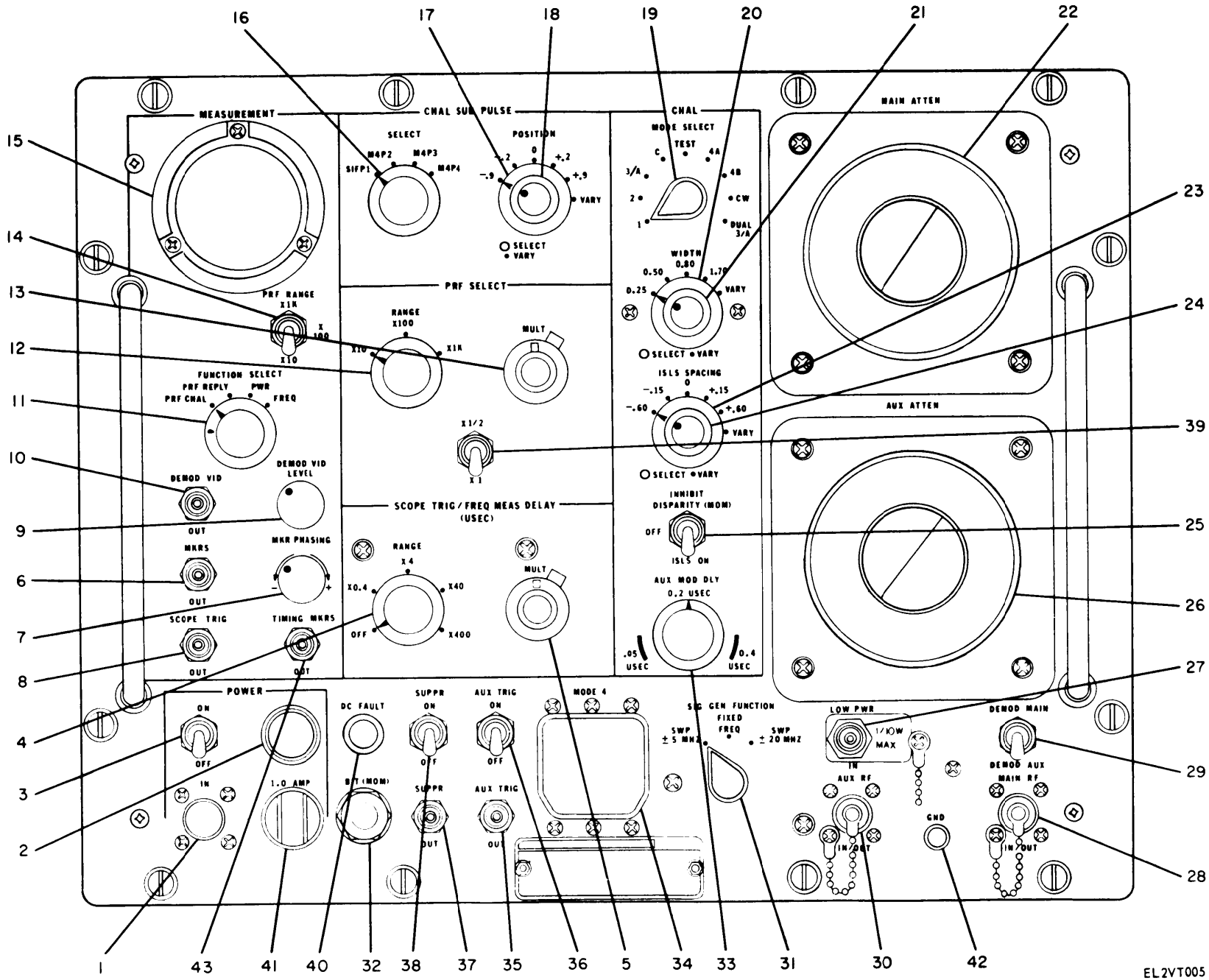

Figure 3-1. Location of test set controls, indicators, and connectors.

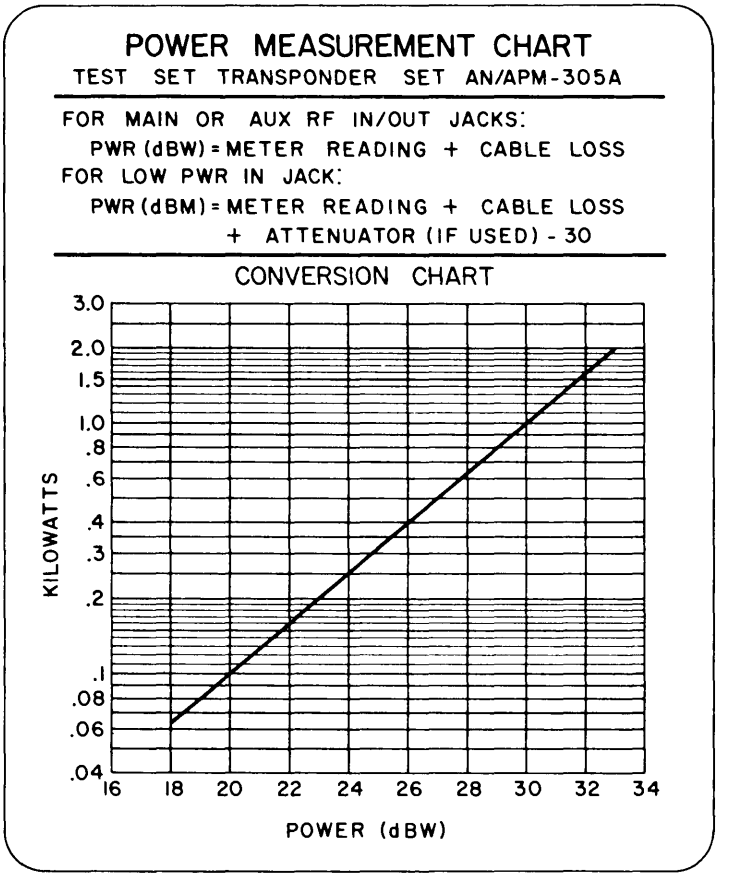

Figure 3-2. Low power measurement calibration chart

Section II. OPERATION UNDER USUAL CONDITIONS AND PREPARATION FOR MOVEMENT

3-3. Preliminary Starting Procedure

No special starting procedures are necessary other than setting POWER ON/OFF switch to ON.

3-4. Procedure for Shutdown

No special stopping procedures are necessary other than setting POWER ON/OFF switch to OFF.

3-5. Preparation for Movement

Prepare the test set for movement as follows:

a. Disconnect all interconnecting cables from both the test set and equipment connected to the test set.

b. Disconnect power cable from test set and power source.

c. Store all cables, adapters, attenuators, loads, and chart in front panel cover.

d. Install front panel cover to test set.

Table 3-1. Operator's Controls, Indicators, and Connectors

Figure 3-1 index No.	Control, indicator, or connector	Function
1	POWER connector	Connects primary power to test set.
2	POWER indicator	Lights when power is applied to test set.
3	POWER ON/OFF switch	In ON position applies power to test set. In OFF position, removes power from test set.
4	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE (5-position rotary) switch	Selects range of delay for either scope trigger or challenge video. When SIG GEN FCTN switch is set to FIXED FREQ, selects range of delay for scope trigger. When SIG GEN FCTN switch is set to either SWP ±5 MHZ or SWP ±20 MHZ, selects range of delay for challenge video. When CHAL MODE SELECT switch is set to DUAL 3/A, selects separa-

Table 3-1. Operator's Controls, Indicators, and Connectors (Continued)

Figure 3-1 index No	Control, indicatar, or connector	Function
		tion between *mode* 3/A challenges. *Switch position* — *Function* OFF — Neither scope trigger nor challenge video is delayed. Scope trigger occurs 27 μsec before P3 pulse when CHAL MODE SELECT switch is set to 1, 2, 3/A, TEST, or DUAL 3/A. Scope trigger occurs 2 μsec before first pulse of challenge video when CHAL MODE SELECT switch is set to 4A or 4B. X0.4 — Scope trigger or challenge video is delayed 0.4 to 4.4 μsec as controlled by SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control. X4 — Scope trigger or challenge video is delayed 4 to 44 μsec as controlled by SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control. X40 — Scope trigger or challenge video is delayed 40 to 440 μsec as controlled by SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control. X400 — Scope trigger or challenge video is delayed 400 to *4400 μ sec* position as controlled by SCOPE TRIG/FRIQ MEAS DELAY (USEC) MULT control.
5	SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control	Varies delay of scope trigger or challenge video within range set by SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch.
6	MEASUREMENT MKRS OUT jack	Provides SIF reply markers for measuring SIF reply spacing or frequency markers used to measure frequency of rf. When CHAL MODE SELECT switch is in any position and SIG GEN FCTN switch is set to FIXED FREQ, SIF reply markers are provided at 0,20.30,24.65, and 49.30 μsec. SIF reply markers are accurate within ±0.02 μsec. When SIG GEN FCTN switch is set to SWP ±5 MHZ, frequency markers corresponding to radiofrequencies of 0, ±1, ±3, and ±5 mHz are provided. The frequency markers are accurate within ±0.1 MHz. The SIG GEN FCTN switch is set to SWP ±20 MHZ, the markers of which represent, 0, ±1, ±3, ±5, and ±20 mHz.
7	MEASUREMENT MKR PHASING control	Varies position of SIF reply markers ± 1 μsec when present at the MEASUREMENT MKR OUT jack. Nominal position of SIF reply markers correspond to nominal position of transponder SIF reply.
8	MEASUREMENT SCOPE TRIG OUT jack	Provides scope trigger signals for use by external oscilloscope. Scope trigger signal is 5 ± 1.0 volts in amplitude and 3.0 ±2.0 μ sec wide when applied to a 100-ohm load.
9	MEASUREMENT DEMOD VIDEO LEVEL control	Adjusts amplitude of signal at MEASUREMENT DEMOD VID OUT jack when MEASUREMENT FUNCTION SELECT switch is set to PWR. When adjusted so that signal at MEASUREMENT DEMOD VID OUT jack is 1.0 volt in amplitude, MEASUREMENT meter indicates peak *power* of rf signal applied to the RF IN/OUT jacks. Peak power of signal applied to LOW PWR MEAS IN jack can also be determined in conjunction with calibration chart packed in front panel cover and illustrated in figure 3-2. The chart converts meter indication into actual power being measured.
10	MEASUREMENT DEMOD VIDEO OUT jack	Provides test set video output for display on external oscilloscope.
11	MEASUREMENT FUNCTION SELECT (4-position rotary) switch	Selects type of measurement to be made with test set. *Switch position* — *Function* PRF CHAL — MEASUREMENT meter indicates prf of challenge video generated by test set. PRF REPLY — MEASUREMENT meter indicates prf of reply video from transponder under test. PWR — Sets test set to measure peak power of input rf signal. When MEASUREMENT DEMOD VIDEO LEVEL control is adjusted so that signal at MEASUREMENT DEMOD VID OUT jack is 1.0 volt in amplitude, MEASUREMENT meter indicates peak power of rf signal applied to the RF

Table 3-1. Operator's Controls, Indicators, and Connectors (Continued)

Figure 3-1 index No.	Control, indicator, or connector	Function
		IN/OUT jacks. Peak power of signal applied to LOW PWR MEAS IN jack can also be determined in conjunction with conversion chart packed in the front panel cover and shown in figure 3-2. This chart is used to convert meter indication to actual power being measured.
		FREQ — Test set is used to measure frequency of input rf signal. Position of video signal with respect to frequency markers on MEASUREMENT MKRS OUT jack can be used to determine input signal frequency. MEASUREMENT meter indicates PRF of reply video from transponder under test.
12	PRF SELECT (3-position) RANGE switch	Selects range of prf of challenge video generated by test set. Actual prf within range is set by PRF SELECT MULT control. When CHAL MODE SELECT switch is set to any position, prf is as indicated below. When PRF SELECT switch is set to X1/2, prf is halved. *Switch position* — *Function* X10 — Sets prf to range of 10 to 110 Hz. X100 — Sets prf to range of 100 to 1100 Hz. X1K — Sets prf to range of 1000 to 11,000 Hz.
13	PRF SELECT MULT control	Adjusts challenge video prf within range selected by PRF SELECT RANGE switch.
14	MEASUREMENT PRF (3-position) RANGE switch	Selects range of prf to be measured by MEASUREMENT meter. Active when MEASUREMENT FUNCTION SELECT switch is set to any position except PWR. *Switch position* — *Function* X1K — Sets MEASUREMENT meter range from 0 to 10,000 Hz. X100 — Sets MEASUREMENT meter range from 0 to 1,000 Hz. X100 — Sets MEASUREMENT meter range from 0 to 100 Hz.
15	MEASUREMENT meter	Indicates prf or peak power, When MEASUREMENT FUNCTION SELECT switch is set to any position except PWR, indicates prf. Range of prf indication is controlled by MEASUREMENT PRF RANGE switch. When MEASUREMENT FUNCTION SELECT switch is set to PWR, indicates peak power of input rf signal when MEASUREMENT DEMOD VIDEO LEVEL control is adjusted so that signal at MEASUREMENT DEMOD VID OUT jack is 1.0 volt in amplitude.
16	CHAL SUB PULSE (4-position rotary) SELECT switch	Substitutes a variable position pulse for one of the following challenge video pulses: SIFP1, M4P2, M4P3, and M4P4. The position of the substitute pulse is controlled by CHAL SUB PULSE POSITION controls.
17	CHAL SUB PULSE (6-position rotary) POSITION SELECT switch	Selects position of substitute pulse selected by CHAL SUB PULSE SELECT switch. *Switch position* — *Function* -.9 — Positions substitute pulse 0.9 μsec ahead of nominal position of challenge pulse. -.2 — Positions substitute pulse 0.2 μsec ahead of nominal position of challenge pulse. 0 — Disables substitute pulse allowing challenge reply video to be generated normally. +.2 — Positions substitute pulse 0.2 μsec after nominal position of challenge pulse. +.9 — Positions substitute pulse 0.9 μsec after nominal position of challenge pulse. VARY — Position of substitute pulse is controlled by CHAL SUB PULSE POSITION VARY control.
18	CHAL SUB PULSE POSITION VARY control	Provides continuous, ±1.0 μ sec from nominal, adjustment of substitute pulse position when CHAL SUB PULSE POSITION SELECT switch is set to VARY.
19	CHAL MODE SELECT (9-position rotary) switch	Selects mode of challenge. *Switch position* — *Function* 1 — Mode 1 challenge video

Table 3-1. Operator's Controls, Indicators, and Connectors (Continued)

Figure 9-1 index No.	Control, indicator, or connector	Function
		2 — Mode 2 challenge video
		31A — Mode 3/A challenge video
		C — Mode C challenge video
		TEST — Test mode challenge video
		4A — Mode 4 maintenance word A challenge video. Also enables operation of functions to MODE 4 connector.
		4B — Mode 4 maintenance word B challenge video. Also enables operation of functions to MODE 4 connector.
		CW — Provides cw rf output for use during selectivity measurements.
		DUAL WA — Provides two mode 3/A interrogations. Spacing between first and second interrogations is controlled by SCOPE TRIG/FREQ MEAS DELAY (USEC) controls. For proper operation, SCOPE TRIG/FREQ MEAS DELAY (USEC) controls must be set to delay greater than 30 μsec. DUAL 3/A is used to check transponder recovery time.
20	CHAL WIDTH SELECT switch	Five-position rotary switch used to select challenge rf pulse width. *Switch position* — *Function*: 0.25 — Sets challenge rf pulse width to 0.25 μsec. 0.50 — Sets challenge rf pulse width to 0.50 μsec. (Nominal pulse width for mode 4 challenge rf.) 0.80 — Sets challenge rf pulse width to 0.80 μsec (Nominal pulse width for SIF challenge rf.) 1.70 — Sets challenge rf pulse width to 1.70 μ sec. VARY — Width of challenge rf pulses is controlled by CHAL WIDTH VARY control.
21	CHAL WIDTH VARY control	Provides continuous adjustment of challenge rf pulse width, from less than 0.25 to at least 1.7 μsee, when CHAL WIDTH SELECT switch is in VARY,
22	MAIN ATTEN control	Used to determine level of output rf signal at RF IN/OUT MAIN jack. Output level is variable from -10 to -90 dBm. Control is calibrated in dBm.
23	CHAL ISLS SPACING SELECT switch	Six-position rotary switch used to control positioning of ISIS pulse. Active when CHAL INHIB switch is set to ISIS ON. *Switch position* — *Function*: -.60 — Positions ISLS pulse 0.60 μsec ahead of nominal position. -.15 — Positions ISLS pulse 0.15 μsec ahead of nominal Position. 0 — Positions ISLS pulse at nominal position. +.15 — Positions ISLS pulse 0.15 μ sec after nominal position. + .60 — Positions ISLS pulse 0.60 μsec after nominal position. VARY — Position of ISLS pulse is controlled by CHAL ISLS SPACING VARY control.
24	CHAL ISLS SPACING VARY control	Provides continuous ±1 μ sec adjustment of ISLS pulse position, when CHAL ISLS SPACING SELECT switch is set to VARY.
25	CHAL INHIB	Three-position toggle switch used to control generation of ISLS pulse (SIF or mode 4) or disparity pulse (Mode 4 only). *Switch position* — *Function*: DISPARITY (MOM) — Momentary position inhibits pulse in 66 μsec position of MODE 4 challenge rf, enables a disparity pulse to disparity output of MODE 4 connector and inhibits three-pulse reply output of MODE 4 connector, OFF — No ISLS or disparity pulses are generated. ISLS ON — Enables ISLS pulse to be inserted into challenge rf (SIF or mode 4), provides a disparity pulse (mode 4 only) to disparity output MODE 4 connector and inhibits three-pulse reply output from

Table 3-1. Operator's Controls, Indicators and Connectors (Continued)

Figure 3-1 index No.	Control, indicatar, or con nectar	Function
		MODE 4 connector. Amplitude of ISLS pulse relative to other challenge video is controlled by AUX ATTN. Rf output is available at RF IN/OUT MAIN jack only.
26	AU X ATTEN control	Used to control level of output rf at RF IN/OUT AUX jack or level of ISLS pulse at RF IN/OUT MAIN jack when ISLS is selected. Control is calibrated in dBm. Output level is variable from -10 to -90 dBm. Separate ISLS scale for O to 9 dB relative to MAIN output level.
27	LOW PWR IN jack	Used when testing signals with power levels less than +3 dBm. Also used during self-test to connect either RF IN/OUT jack to test set receiver input. **NOTE** Termination must be installed on LOW PWR IN jack when signal under test is not being applied to low PWR IN jack for proper receiver operation.
28	RF IN/OUT MAIN jack	Used to connect test set to equipment under test. Rf output of equipment under test is available for measurement by test set when RF IN/OUT DEMOD switch is in MAIN position.
29	RF IN/OUT DEMOD switch	Used to select rf input applied to test set receiver. In MAIN position, rf signals from RF IN/OUT MAIN jack are applied to receiver and in AUX position, rf signals from RF IN/OUT AUX jack are applied to receiver,
30	RF IN/OUT AUX jack	Used to connect test set to diversity transponder under test. The output of equipment under test is available for measurement by the test set when RF IN/OUT DEMOD switch is in AUX position. Not used for single channel transponder.
31	SIG GEN FCTN switch	Three-position rotary switch used to determine mode of rf output. Used for transmitter frequency and receiver bandwidth tests. *Switch position* — *Function* SWP ± MHZ — Selects ±5 MHZ rf sweep frequency operation. Frequency markers are applied to MEASUREMENT MKRS OUT jack. Prf is 800 ±80 Hz. FIXED FREQ — Selects fixed frequency operation. SIF reply markers are applied to MEASUREMENT MKRS OUT jack except when CHAL MODE SELECT switch is in CW position. SWP ±20 MHZ — Selects ±20 MHz rf sweep frequency operation. Frequency markers are applied to MEASUREMENT MKRS OUT jack. Prf is 250 ±25 Hz.
32	BIT (MOM) switch	Momentary pushbutton switch used to activate self-test circuits of test set. When depressed, self-test oscillator is energized to check sweep rf operation and enables mode *4* replies.
33	CHAL AUX MOD DLY control	Varies delay of challenge video applied to auxiliary rf channel *0.05* to 0.4 µsec from the challenge video applied to main rf channel. Control has detent at 0,2 ±0.05 µ sec. Delay is used to check diversity operation of transponders.
34	MODE 4 connector	Used, when test set is in Mode 4 mode of operation, to connect test set to Test Set, Transponder Set AN/APM-239A.
35	AUX TRIG OUT	Provides auxiliary trigger signal when AUX TRIG switch is at ON. The auxiliary trigger signal is 20.0 ± 3 volts in amplitude and 1 ± 0.05 µsec wide when applied to a 93 ohm load. Auxiliary trigger occurs 4 µ sec after oscilloscope trigger when SIG GEN FCTN switch is in FIXED FREQ position and is coincident with oscilloscope trigger when SIG GEN FCTN switch is in either SWP position.
36	AUX TRIG ON/OFF switch	Toggle switch used to control auxiliary trigger signal. When in ON position, applies auxiliary trigger to AUX TRIG OUT jack; when in OFF position, auxiliary trigger is not applied to jack.
37	SUPPR OUT jack	Provides suppression signal when SUPPR switch is at ON. Signal is 20.0 ±2 volts in amplitude and 30 ±3 µsec wide when terminated by a 2200 ohm load. Suppression pulse occurs 1 µsec after pulse on MEASURE MENT SCOPE TRIG OUT jack when SIG GEN FCTN switch is set to FIXED FREQ.

Table 3-1. *Operator's Controls, Indicators, and Connectors (Continued)*

Figure 3-1 index No.	Control, indicator, or connector	Function
38	SUPPR switch	Toggle switch used to control suppression signal when in ON position, applies suppression signal to SUPPR OUT jack; when in OFF position, suppression signal is not applied to jack.
39	PRF SELECT switch	Toggle switch in X 1/2 position divides PRF by 2.
40	POWER DC FAULT indicator	Lights when test set power supply is malfunctioning or when lens cap is activated for self-test.
41	POWER 1 AMP fuse holder	Contains fuse that protects test set from primary power overload. Lights when fuse is faulty.
42	GND	Chasais ground
43	TIMING MARKERS	Crystal frequency markers for accurate pulse measurements provides 0.1, 1.0, and 10.0 μsec markers.

CHAPTER 4
OPERATOR/CREW MAINTENANCE INSTRUCTIONS

4-1. Tools and Equipment

The following test equipment is required for organizational maintenance:

a. Multimeter AN/USM-223.

b. Oscilloscope AN/USM-281A or oscilloscope AN/USM-281C.

c. Tools. Tools required for organizational maintenance are included in standard issue Tool Kit, Electronic Equipment TK-105/G.

4-2. Lubrication

Lubrication of the test set is not required.

4-3. Preventive Maintenance Checks and Services

To insure that Transponder Set AN/APM 305 A is always ready for operation, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed and described in table 4-1. The step numbers indicate the sequence of and minimum inspection required. Defects discovered during operation of the unit will be noted for future correction to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment. Record all deficiencies together with the corrective action taken on forms per TM 38-750. Instructions for performing the required checks are identified as periodic checks.

4-4. Preventive Maintenance

These checks and services are to maintain electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the charts indicate what to check, how to perform the check and what action to take to correct a faulty indication. The *Reference* column lists the illustration, paragraph, or other manual that contains detailed repair or replacement instructions. If the defect cannot be remedied by performing the corrective action indicated, a higher category of maintenance is required.

4-5. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services for the test set are required daily, weekly, and quarterly.

4-6. Daily Preventive Maintenance Checks and Services

The following chart specifies checks and services that must be accomplished daily.

Sequence No.	Item to be Inspected	Procedure	Reference
1	Exterior surfaces	Clean exterior surfaces including test set panel assembly.	Para 5-2
2	Controls and indicators	During operation of test set, observe that each control and indicator functions properly. Mechanical action of each knob, dial, and switch should be smooth and free of external or internal binding. Tighten loose controls as required.	None
3	Operation	When operating test set, be alert for any unusual performance or condition.	None

4-7. Weekly Preventive Maintenance Checks and Services

The following chart specifies checks and services that must be accomplished weekly or at least once each month if the test set is not used periodically.

Sequence No.	Item to be Inspected	Procedure	Reference
		POWER OFF INSPECTION	
1	Completeness	See that equipment is complete.	Para 1-12
2	Exterior items	Check for looseness of exterior items, such as connectors, switches, and latches. Tighten all loose mounting screws and nuts.	None
3	Cables	Check cables for breaks, cuts, kinks, fraying, and broken connectors; replace defective cables.	None
4	Connectors	Inspect connectors for snug fit and good contacts.	Higher category maintenance required
5	Handles, latches, and hinges	Check handles, latches, and hinges for looseness and defects.	Higher category maintenance required
6	Metal surfaces	Check all exposed metal surfaces for rust and cor-	Para 5-3

Sequence No.	Item to be Inspected	Procedure	Reference
		rosion. Clean and touch up paint as required.	
		POWER ON INSPECTION	
7	Operation	Perform operator's checklist. During operation, be alert for unusual or faulty operation. If such conditions are observed, higher category of repair is required.	Para 2-11
8	Knobs and switches	When performing operator's checklist check to see that mechanical action of switches and knobs is smooth, and free of binding and scraping.	Para 5-9

4-8. Quarterly Preventive Maintenance Checks and Services

The following chart specifies checks and services that must be performed on a quarterly basis. These checks must also be performed when the test set is initially installed.

Sequence No.	Item to be Inspected	Procedure	Reference
		POWER OFF INSPECTION	
1	Publications	See that all publications are complete and current.	DA Pam 310-4
2	Modifications	Check to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	DA Pam 310-7
3	Preservation	Check all surfaces for evidence rust and corrosion. Remove rust and corrosion and paint bare spots.	Para 5-2 and 5-3
4	Cables	Check cables for proper mating.	
		POWER ON INSPECTION	
5	Operation	Perform quarterly test procedure. During operation be alert for unusual or faulty operation. If such conditions are observed, higher category of maintenance is required.	Table 4-1

4-9. Quarterly Test Procedure

a. General. The quarterly test procedure (table 4-1) is performed to insure the operational status of the test.

b. Use of Table. The quarterly test procedure table is a step-by-step test procedure and should be performed in the order given. The *Control settings* column specifies the settings of the equipment to be changed for the specific measurement. The *Test procedure* column refers to the applicable test setup and provides specific parameters to be measured. The *Performance standard* column specifies the results that should be observed. In all steps, except 1 and 2, if the results specified are not obtained, higher category of maintenance is required. If the results specified for steps 1 and 2 are not obtained, refer to the troubleshooting chart (para 4-11). Waveforms applicable to the steps of the quarterly test procedure are illustrated in figure 4-1.

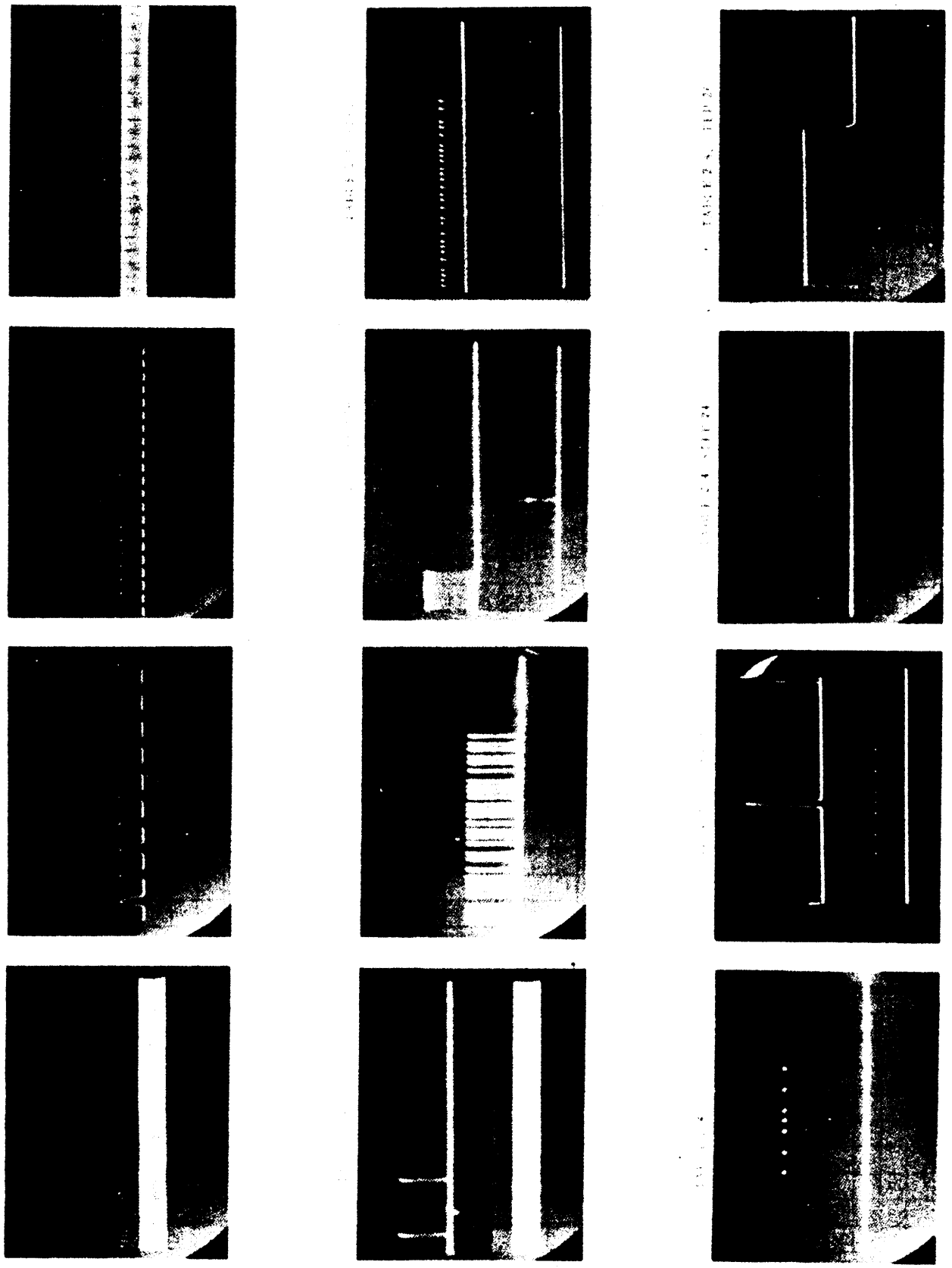

Figure 4-1. ① Operator's checklist and quarterly test procedure waveforms (sheet 1 of 2).

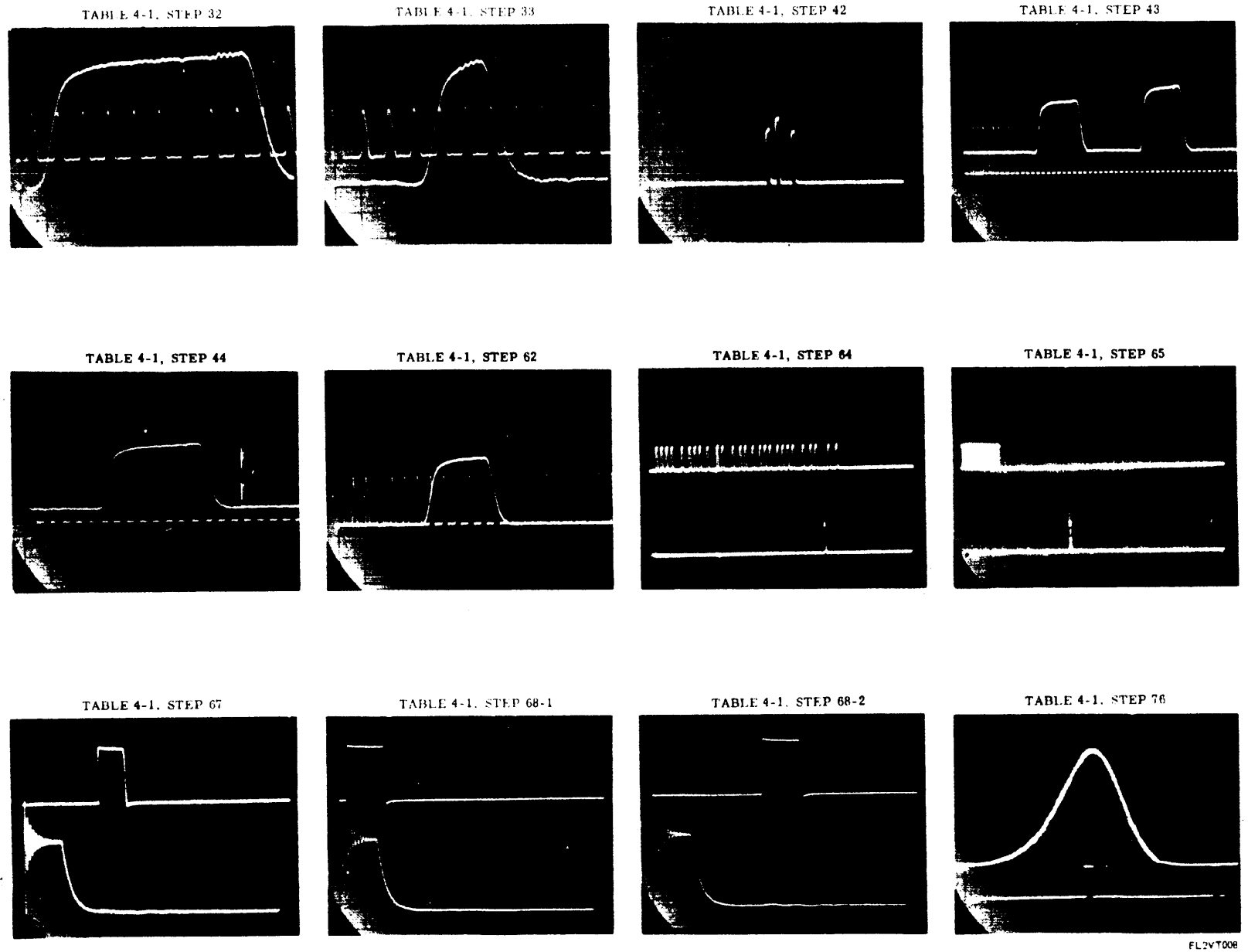

Figure 4-1. ② *. Operator's checklist and quarterly test procedure waveforms (sheet 2 of 2).*

c. Additional Equipment. The additional equipment required to perform the quarterly test procedure is Oscilloscope AN/USM-281(*).

d. Oscilloscope 7ime Differential (Delay) Measurement Procedure. To provide the greatest accuracy when measuring delays, certain steps of the quarterly test procedures (table 4-1) delays shall be measured as follows:

(1) With oscilloscope sweep display switch set to MAIN, adjust DIV DELAY control to position intensified trace (reduce INTENSITY setting as necessary to view) over first point of interest on waveform.

(2) Set sweep display switch to DELAYED.

(3) Readjust DIV DELAY control to position point of interest on waveform exactly on a vertical reference line (normally center vertical line of graticule).

(4) Record setting of DIV DELAY control.

(5) Set sweep display switch to MAIN.

(6) Adjust DIV DELAY control to position intensified trace over second point of interest on waveform.

(7) Set sweep display switch to DELAYED.

(8) Readjust DIV DELAY control to position second point of interest on waveform exactly on vertical reference line (same reference line used in (3) above).

(9) Record setting of DIV DELAY control.

(10) Calculate difference between setting recorded in (4) above and setting recorded in (9) above.

(11) Multiply MAIN TIME/DIV switch setting by difference obtained in (10) above to obtain delay between two points of interest on waveform.

4-10. General Troubleshooting Information

The troubleshooting chart (para 4-11) lists symptoms that may be observed while performing the operator's preventive maintenance checks. If a malfunction occurs, perform the corrective actions indicated. Any malfunction that is beyond the scope of the operator to correct shall be referred to a higher category of maintenance.

Table 4-1. Quarterly *Test Procedure*

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
			Power Supply Test	
1	Set up oscilloscope as described in paragraph 2-11c	Set up test set as described in paragraph 2-11d	Check POWER indicator	POWER indicator illuminates.
2			Check POWER DC FAULT indicator.	POWER DC FAULT indicator is extinguished.
3			Press POWER DC FAULT indicator.	POWER DC FAULT indicator illuminates.
			PRF Generator PRF Measuring Section Test	
4			Adjust PRF SELECT MULT control until meter indicates 9.0 on Hz scale.	PRF SELECT RANGE and MULT controls indicate prf is 8, 100 to 9,900 Hz.
5		PRF SELECT RANGE switch X100 - MEASUREMENT PRF RANGE switch X1OO	Adjust PRF SELECT MULT control until meter indicates 10.0 on Hz scale.	PRF SELECT RANGE and MULT controls indicate prf is 900 to 1100 Hz.
6		PRF SELECT RANGE switch X10 MEASUREMENT PRF RANGE switch X1O	Adjust PRF SELECT MULT control until meter indicates 10.0 on Hz scale.	PRF SELECT RANGE and MULT controls indicate prf is 81 to 110 Hz.
7		PRF SELECT switch to X 1/2	observe MEASUREMENT meter.	Meter indicates 4.5 to 5.5 on Hz scale.
			Timing Marker Test	
8	DISPLAY switch B B VOLTS/DIV 1. MAIN TIME/DIV DIV 2 µ sec.	MEASUREMENT PRF RANGE switch X1K PRF SELECT RANGE switch X1K PRF SELECT switch X1	Observe three sets of markers. Each set will be of different amplitude and spacing.	Three sets of markers are present.
9	DELAYED TIME/DIV switch 0.1 µ sec Sweep display switch DELAYED		Using time differential measurement procedure described in para *4-9d.* Measure spacing between leading edge of the first lower amplitude set of pulses.	Pulses are spaced 0.1 µ sec ±0.02%, >0.5 volts amplitude.
10	DELAYED TIME/DIV switch 0.2 µ sec		Observe second set of pulses. (Amplitude level more than previous pulses but less than the third set of pulses.)	pulses are spaced 1.0 µ sec ±0.02%, >o.5 volt amplitude.
11	DELAYED TIME/DIV		Observe third set of pulses with first	Pulses am spaced 10.0 µ sec ±0.02% ,

Table 4-1. Quarterly Test Procedure—Continued

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
	2.0 μsec		and second set within.	≥0.5 volt amplitude.
		SIF Challenge Generator Test		
12	DISPLAY switch ALT MAIN TIME/DIV 5 μsec Sweep display SWITCH MAIN	CHAL MODE SELECT switch C PRF SELECT MULT control 5.0	Observe two pulses are present.	Two pulses are present on channel A. Three sets of timing markers are present on channel B. (0.1, 1.0 and 10 μsec).
13	DELAYED TIME/DIV switch .2 μsec.		Using time differential measurement procedure described in para 4-9*d*, measure spacing between leading edges of pulses.	Pulses are spaced 21.0 μsec ±0.05 μsec.
14	Sweep display switch MAIN DELAYED TIME/DIV switch OFF	CHAL MODE SELECT switch 1	Observe number of pulses.	Two pulses are present on channel A. Timing markers are present on channel B.
15		CHAL MODE SELECT switch 2 MEASUREMENT FUNCTION SELECT switch PRF REPLY	Observe number of pulses. Observe MEASUREMENT meter.	Two pulses are present on channel A. Timing markers are present on channel B. Meter indicates prf is 4500 to 5500 Hz.
16		CHAL MODE SELECT switch 3/A	Observe number of pulses.	Two pulses are present on channel A and TIMING MARKERS are present on channel B.
17		CHAL MODE SELECT switch TEST	Observe number of pulses.	Two pulses are present on channel A and timing markers are present on channel B.
18	MAIN TIME/DIV 10 μsec DISPLAY A	CHAL MODE SELECT switch 4A PRF SELECT X 1/2	Observe number of pulses.	Total of 28 pulses displayed.
19	DELAYED TIME/DIV switch 1 μSEC DISPLAY switch ALT		Using procedure described in paragraph 4-9*d*, measure spacing between first four pulses and last two pulses.	First four pulses are each spaced in 2.0 μsec ±0.07 μsec increments. Last two pulses are spaced 3.0 μsec ±0.05 μsec.
20	Sweep display switch MAIN. DELAYED TIME/DIV switch OFF.	CHAL MODE SELECT switch 4B	Observe number of pulses.	Total of 28 pulses displayed. Meter indicates prf of 2250 to 2750 Hz.
		Dual 3/A Mode Operation Test		
21	MAIN TIME/DIV switch 50 μSEC B INPUT VOLT/DIV .2	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X40	Disconnect cable from test set MEASUREMENT SCOPE TRIG OUT jack and connect to AUX TRIG OUT jack	Spacing between challenge trains vary with SCOPE TRIG/FREQ MEAS (USEC) MULT control from 40 to greater than 400 μsec.
		CHAL MODE SELECT switch DUAL 3/A	Disconnect cable from test set TIMING MRKS jack J8 and connect to MRKS jack J2.	
		PRF SELECT RANGE switch X100	Observe that display consists of two challenges. Vary SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control.	
			SIF Marker Test	
22	B INPUT VOLTS/DIV switch .5 MAIN TIME/DIV 10 μsec.	CHAL MODE SELECT switch 1 SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch OFF	Disconnect cable from test set AUX TRIG OUT jack and connect to MEASUREMENT SCOPE TRIG OUT jack. Observe markers on oscilloscope B INPUT.	Four markers are displayed on B INPUT.
23	Sweep display switch DELAYED	PRF SELECT RANGE X1K. PRF SELECT X1.	Using oscilloscope DIV DELAY control, measure spacing between second pulse on A INPUT and first pulse on B input while varying test set MEASUREMENT MKR PHASING control.	First marker on B INPUT moves at least from 2 to 4 μsec from second pulse on A INPUT.
24	MAIN TIME/DIV 10 μsec DELAYED TIME/DIV		Connect A INPUT of oscilloscope to TIMING MRKS jack J8. Using procedure described in paragraph	Markers are spaced 20.30 μsec ±0.02 μsec.

Table 4-1. Quarterly Test Procedure—Continued

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
	.2 μsec		4-9*d*, measure spacing between leading edges of first and second markers on B INPUT.	
25			Using procedure described in paragraph 4-9*d*, measure spacing between leading edges of first and third markers on B INPUT.	Markers are spaced 24.65 μsec ±0.02 μsec.
26			Using procedure described in paragraph 4-9*d*, measure spacing between leading edges of first and fourth markers on B INPUT.	Markers are spaced 49.30 μsec ±0.02 μsec.
			Delay Operation Test	
27	Sweep display switch MAIN. MAIN TIME/DIV switch 5 μsec. DISPLAY switch B	PRF SELECT MULT control 1.0		Note position of first marker.
28		SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X0.4 SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control 5.0	Markers shift toward beginning of sweep. Vary SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control.	Marker shifts when SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control is varied.
29		SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X4	Markers shift toward beginning of sweep. Vary SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control.	Marker shifts when SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control is varied.
30	MAIN TIME/DIV switch .1 MSEC	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X40 SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control 1.0	Second set of markers shifts toward beginning of sweep. Vary SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control.	Markers shift when SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control is varied.
31		SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X400	Markers shift toward beginning of sweep. Vary SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control.	Markers shift when SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control is varied.
			SIF Pulse Width Test	
32	DISPLAY switch ALT. DELAYED TIME/DIV switch .1 μSEC. Sweep display switch DELAYED. MAIN TIME/DIV switch 5 μSEC A VOLTS/DIV. .2	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch OFF. Move MRKS OUT input cable to DEMOD V1D OUT jack. PRF SELECT MULT 5.0	Adjust oscilloscope DIV DELAY control until first pulse is centered on display. Measure pulse width at 50 percent of pulse amplitude.	Pulse width is 0.8 μsec ±0.07 μsec.
33		CHAL WIDTH SELECT switch 0.25	Measure pulse width at 50 percent of pulse amplitude.	Pulse width is 0.25 μsec ±0.07 μsec.
34		CHAL WIDTH SELECT switch 0.50	Measure pulse width at 50 percent of pulse amplitude.	Pulse width is 0.50 μsec ±0.07 μsec.
35	DELAYED TIME/DIV switch .2 μSEC.	CHAL WIDTH SELECT switch 1.70	Measure pulse width at 50 percent of pulse amplitude.	Pulse width is 1. 70 μsec ±0.07 μsec.
36		CHAL WIDTH SELECT switch VARY	Adjust CHAL WIDTH VARY control throughout entire range.	Pulse can be varied from less than 0.25 to more than 1.70 μsec.
			Auxiliary Modulation Delay Test	
37	Sweep display switch MAIN. MAIN TIME/DIV switch 5. μSEC. DELAYED TIME/DIV switch 1.0 μSEC	CHAL WIDTH SELECT control 0.80 CHAL AUX MOD DLY control at detent position (0.2 USEC)	Adjust test set SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control until leading edge of first pulse is on oscilloscope graticule.	Leading edge of pulse is centered on oscilloscope graticule.

Table 4-1. Quarterly Test Procedure—Continued

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
	DISPLAY switch B	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X4. SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control 1.0	**NOTE** Do not disturb any control settings between steps 37 and 38 after pulse has been positioned. Disconnect cable connected to test set RF IN/OUT MAIN jack and connect cable to RF IN/OUT AUX jack. Observe oscilloscope **NOTE** If pulse appears but positioning is out of tolerance adjusted as instructed in paragraph 5-8.	Leading edge of pulse is delayed 0.2 ±0.05 μsec from position of pulse in step 37.
39	DELAYED TIME/DIV switch .1 μSEC	CHAL AUX MOD DLY control fully counterclockwise SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch OFF	Repeat steps 32 through 36.	Same as steps 32 through 36.
40	Sweep display switch MAIN		Vary test set CHAL AUX MOD DLY control and observe position of challenge video.	Position of challenge varies with variation of CHAL AUX MOD DLY control.
			ISLS Operation Test	
41		CHAL INHIB switch ISLS on	Observe no video.	No video is present.
42		CHAL WIDTH SELECT switch 0.80 CHAL MODE SELECT switch 2	Disconnect cable from test set RF IN/OUT AUX jack and connect to RF IN/OUT MAIN jack. Observe oscilloscope display.	Oscilloscope displays three pulses. (Pulses are equal to a greater than P 3 pulse.)
43	Sweep display switch DELAYED. DELAYED TIME/DIV switch .5 μSEC DISPLAY switch ALT.		Adjust oscilloscope DIV DELAY control until first and second pulses are displayed. Measure spacing between leading edges of first and second pulses.	Pulses are spaced 2.0 μsec ±0.05 μsec.
44	DELAYED TIME/DIV switch .2 USEC		Using oscilloscope DIV DELAY control, center second pulse on oscilloscope display. Measure width of second pulse at 50 percent of pulse amplitude.	Pulse width is 0.8 μsec ±0.07 μsec.
45	DELAYED TIME/DIV switch .5 μSEC	CHAL ISLS SPACING SELECT switch -.60	Using oscilloscope DIV DELAY control, center first and second pulses on oscilloscope display. Measure spacing between leading edges of first and second pulses.	Pulses are spaced 1.4 μsec ±0.05 μsec.
46		CHAL ISLS SPACING SELECT switch -.15	Measure spacing between leading edges of first and second pulses.	Pulses are spaced 1.85 μsec ±0.05 μsec.
47		CHAL ISLS SPACING SELECT switch +.15	Measure spacing between leading edges of first second pulses.	Pulses are spaced 2.15 μsec ±0.05 μsec.
48		CHAL ISLS SPACING SELECT switch +.60	Measure spacing between leading edges of first and second pulses.	Pulses are spaced 2.60 μsec ±0.05 μsec.
49		CHAL ISLS SPACING SELECT switch VARY	Vary test set CHAL ISLS SPACING VARY control through its entire range. Measure spacing between first and second pulses.	Pulse spacing can be carried from less than 1.4 μsec to more than 2.60 μsec.
			Substitute Pulse Test	
50	Sweep display switch MAIN	CHAL INHIB switch OFF	Observe two pulses are present.	Two pulses are present.

Table 4-1. Quarterly Test Procedure—Continued

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
	DISPLAY switch B.	CHAL SUB PULSE POSITION SELECT switch -.9		
51		CHAL MODE SELECT switch 3/A	Observe two pulses are present.	Two pulses are present.
52		CHAL MODE SELECT switch C	Observe two pulses are present.	Two pulses are present.
53		CHAL MODE SELECT switch 1	Observe two pulses are present.	Two pulses are present.
54	DELAYED TIME/DIV switch .1 μSEC. Sweep display switch DELAYED. DISPLAY switch ALT.		Using procedure described in paragraph 4-9*d*, measure spacing between leading edges of pulses.	Pulses are spaced 3.9 μsec ±0.05 μsec.
55		CHAL SUB PULSE POSITION SELECT switch -.2	Using procedure described in paragraph 4-9*d*, measure spacing between leading edges of pulses.	Pulses are spaced 3.2 μsec ±0.05 μsec.
56		CHAL SUB PULSE POSITION SELECT switch +.2	Using procedure described in paragraph 4-9*d*, measure spacing between leading edges of pulses.	Pulses are spaced 2.8 μsec ±0.05 μsec.
57		CHAL SUB PULSE POSITION SELECT switch +.9	Using procedure described in paragraph 4-9*d*, measure spacing between leading edges of pulses.	Pulses are spaced 2.1 μsec ±0.05 μsec.
58	DELAYED TIME/DIV switch .5 μSEC	CHAL SUB PULSE POSITION SELECT switch VARY	Adjust test set CHAL SUB PULSE POSITION VARY control throughout entire range.	Pulse spacing can be varied from less than 2.0 μsec to more than 4.0 μsec.
59	MAIN TIME/DIV switch 2 μSEC.	CHAL MODE SELECT switch 4A.		
	Sweep display switch MAIN DISPLAY switch B.	PRF SELECT X1/2	Vary CHAL SUB PULSE POSITION VARY control. Observe pulses.	Second pulse positioning is varied.
		CHAL SUB PULSE SELECT switch M4P2.		
60		CHAL SUB PULSE SELECT switch M4P3	Vary test set CHAL SUB PULSE POSITION VARY control. Observe pulses.	Third pulse positioning is varied.
61		CHAL SUB PULSE SELECT switch M4P4	Vary test set CHAL SUB PULSE POSITION VARY control. Observe pulses.	Fourth pulse positioning is varied.
			Mode 4 ISLS Test	
62	Sweep display switch DELAYED DISPLAY switch ALT.	CHAL SUB PULSE POSITION SELECT control 0. CHAL INHIB switch ISLS ON	Adjust oscilloscope DIV DELAY control to view ISLS (fifth) pulse. Measure pulse width of fifth pulse and spacing between fourth and fifth pulses.	ISLS pulse width is 0.5 μsec ±0.07 μsec. Pulses are spaced 2.0 μsec ±0.05 μsec.
63	MAIN TIME/DIV switch 10 μSEC. B INPUT VOLTS/DIV switch 2 Disconnect channel B from scope and connect scope probe to channel B.		Connect oscilloscope probe between oscilloscope B INPUT and contest set MODE 4 connector, pin 4. Press and hold BIT (MOM) switch. Using oscilloscope DIV DELAY control locate last pulse on A INPUT. Note spacing between leading edges of last pulse on A INPUT and pulse on B INPUT. Measure width of pulse on B INPUT.	Last pulse on A INPUT and pulse on B INPUT are within ±1.0 μsec of each other. B INPUT pulse width is 0.5 μsec ±0.1 μsec.
			Disparity Test	
64	Sweep display switch MAIN.		Press and hold CHAL INHIB switch to DISPARITY (MOM). Note pulse in twenty-sixth (66 μsec) position of A INPUT. **NOTE** With various oscilloscopes, step 64 may not be ac-	Pulse at twenty-sixth (66 μsec) position disappears from A INPUT and appears on B INPUT.

Table 4-1. Quarterly Test Procedure—Continued

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
			complished as one measurement. If test procedure standard cannot be accomplished as one measurement, measure spacing between fourth and last pulses on A INPUT and record spacing. Set oscilloscope MAIN TIME/DIV switch to 50 μsec and measure spacing between last pulse on A INPUT and first pulse on B INPUT and record spacing. Add results of two measurements, this should equal performance standard.	
65	MAIN TIME/DIV switch 50 μsec DELAYED TIME/DIV switch 1 μSEC. Sweep display switch MAIN.	CHAL INHIB switch OFF. PRF SELECT RANGE switch X100.	Connect oscilloscope B INPUT to MODE 4 connector, pin 1. Press and hold BIT (MOM) switch. Using procedure described in paragraph 4-9*d*, measure spacing between leading edges of fourth pulse on A INPUT and first pulse on B INPUT.	Spacing between fourth pulse on A INPUT and first pulse on B INPUT is 200 μsec ±μsec.
66	DELAYED TIME/DIV switch .5 μSEC.	Press and hold BIT (MOM) switch.	Adjust oscilloscope DIV DELAY control to view three pulses on B INPUT. Measure pulse width. Measure pulse spacing.	Pulses are 0.5 μsec ±0.1 μsec wide and are spaced 1.8 μsec ±0.1 μsec.
			Auxiliary Trigger Tests	
67	Sweep display switch MAIN. MAIN TIME/DIV switch 1 μSEC EXT + 10/EXT/INT/LINE switch INT. A INPUT VOLTS/DIV switch 10. DISPLAY switch ALT B	PRF SELECT switch X1	Disconnect oscilloscope probe between oscilloscope B INPUT and test set MODE 4 connector, pin 1. Disconnect cable from oscilloscope MAIN EXT INPUT and connect to B INPUT. SYNC MAIN TRIG IN of oscilloscope to B INPUT of oscilloscope. Disconnect cable from test set MEASUREMENT DEMOD VID OUT jack and connect to AUX TRIG OUT jack. *a.* Measure width of pulse on A INPUT. *b.* Measure spacing between leading edges of pulses on A and B INPUTS.	 *a.* Pulse is 1.0 ±0.5 μsec wide. *b.* Spacing between pulses is 4 ±1.0 μsec.
			Delay Between Scope Trig and Aux Trig Test	
68		SIG GEN FCTN switch SWP ±20 MHZ SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X0.4	Vary SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control throughout entire range.	Pulse on A INPUT can be positioned from 0.4 μsec to 4.4 μsec from pulse on B INPUT
69	MAIN TIME/DIV switch 5 μSEC	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X4 SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control 10.0	Measure delay between pulse on B INPUT and pulse on A INPUT.	Delay between pulses is 40 μsec 40 μsec ±4.0 μsec.
70	MAIN TIME/DIV switch 50 μSEC	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X40	Measure delay between pulse on B INPUT and pulse on A INPUT	Delay between pulses is 400 μsec ±40 μsec.

Table 4-1. Quarterly Test Procedure—Continued

Step No.	Control Settings: Oscilloscope	Control Settings: Test set	Test procedure	Performance standard
71	MAIN TIME/DIV switch .5 MSEC	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch X400 SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control 5.0	Measure delay between pulse on B INPUT and pulse on A INPUT	Delay between pulses is nominally 2000 μsec $\pm$200 μsec.
			Suppression Pulse Operation	
72	MAIN TIME/DIV switch 5 μSEC DISPLAY switch A.	SCOPE TRIG/FREQ MEAS DELAY (USEC) RANGE switch OFF PRF SELECT RANGE switch X1K SIG GEN FCTN switch FIXED FREQ	Remove cable from test set AUX TRIG OUT to oscilloscope A INPUT jack. Connect cable from test set SUPR OUT jack to oscilloscope A INPUT jack (with no termination). Measure A INPUT pulse width and amplitude.	Pulse is 30 $\pm$3 μsec in duration, 20 $\pm$2 volts in amplitude.
			Power Output and Measurement Test	
73	A INPUT VOLTS/DIV switch .2 DISPLAY switch A. EXT + 10/EXT/INT/LINE switch EXT	MEASUREMENT FUNCTION SELECT switch PWR. CHAL MODE SELECT switch 1	Reconnect test setup as shown in figure 2-3, except delete termination on oscilloscope B INPUT. Adjust MAIN TRIGGER LEVEL for stable display.	
			Adjust test set MEASUREMENT DEMOD VIDEO LEVEL control until video displayed is 1.0 volt in amplitude.	MEASUREMENT meter indicates 19 to 21 dbw.
			Observe MEASUREMENT meter.	
74			Disconnect cable from test set RF IN/OUT MAIN jack and connect to RF IN/OUT AUX jack.	
			Adjust MEASUREMENT DEMOD VIDEO LEVEL control until video is 1.0 volt in amplitude.	Measurement meter indicates 19 to 21 dbw.
			Observe MEASUREMENT meter.	
			Swept RF Test	
75	A VOLTS/DIV switch 2. DISPLAY switch ALT. MAIN TIME/DIV switch .1 MSEC	SIG GEN FCTN switch SWP $\pm$5 MHZ MEASUREMENT FUNCTION SELECT switch FREQ. Remove cable rf from TIMING MKRS OUT (J8) and connect to MKRS OUT (J2).	Count number of markers on B INPUT.	Seven markers appear on B INPUT, representing 0, $\pm$1, $\pm$3, and $\pm$5 MHz.
76			Activate and hold test set BIT (MOM) switch. Observe signal on A INPUT. Measure frequency of signal on A INPUT by interpolating between markers on B INPUT.	Frequency of signal on A INPUT is 1090 $\pm$0.3 MHz as referenced to 1089, 1090, and 1091 MHz markers on B INPUT.
77		MEASUREMENT FUNCTION SELECT switch PRF CHAL MEASUREMENT PRF RANGE switch X100	Observe MEASUREMENT meter.	Meter indicates 720 to 880 pps.
78	DISPLAY switch B MAIN TIME/DIV switch .2 MSEC	SIG GEN FCTN switch SWP $\pm$20 MHZ	Readjust MAIN and DELAYED TIME/DIV switches and VERNIER controls to display complete set of markers. Count markers.	Nine markers are present representing 0, $\pm$1, $\pm$3, $\pm$5 and $\pm$20 MHz.
79			Observe MEASUREMENT meter.	Meter indicates 225 to 275 pps.

4-11. Troubleshooting Chart

Trouble symptoms	Probable trouble	Checks and corrective measures
Switch knobs missing or broken.		Replace knobs.
POWER indicator does not light.	*a.* Power cable or POWER indicator lamp defective.	*a.* Replace lamp and/or power cable.
	b. Defective fuse.	*b.* Replace fuse.
DC FAULT indicator does not light when tested.	Defective lamp.	Replace lamp.
No signal when using attenuator connected to LOW PWR MEAS IN jack.	Defective attenuator.	Replace attenuator.
Improper operation of one cable or adapter (check by substitution of like cable).	Defective cable or adapter (isolate by continuity check).	Replace cable or adapter.
Improper aux modulation delay operation.	CHAL AUX MOD DLY knob improperly adjusted.	Adjust (para 5-8).

CHAPTER 5
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

5-1. General

Maintenance of the test set consists of cleaning the exterior, replacing lamps and fuses, and minor cable repair.

5-2. Cleaning

WARNING

The fumes of TRICHLOROETHANE are toxic. Provide thorough ventilation whenever it is used; avoid prolonged or repeated breathing of vapor. Do not use near an open flame or hot surface; trichloroethane is nonflammable but heat converts the fumes to a highly toxic phosgene gas the inhalation of which could result in serious injury or death. Prolonged or repeated skin contact with trichloroethane can cause skin inflammation. When necessary, use gloves, sleeves and aprons which the solvent cannot penetrate.

CAUTION

Do not use trichloroethane on any painted or silk-screened surface of the test set.

Clean the front panel and control knobs with a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water and use a mild soap. Clean exterior metal surfaces as follows:

a. Remove moisture and loose dirt with a clean cloth (item 2, app E).

b. Remove grease, fungus, and ground-in-dirt with isopropyl alcohol (item 6, app E).

c. Clean unpainted surfaces with trichloroethane (item 4, app E).

d. Remove dirt from hard-to-reach areas with a brush (item 3, app E).

5-3. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding with fine sandpaper (item 1, app E). Brush two thin coats of paint on the bare metal to protect from further corrosion. Refer to applicable cleaning and refinishing practices specified in TB746-10.

5-4. Replacement of POWER Indicator Lamp

Remove and replace the lamp as follows:

a. Unscrew indicator cap by turning it counterclockwise.

b. Press lamp in and turn it counterclockwise to remove.

c. Install a replacement lamp (NE51H, NSN 6240-00-683-3411) into lamp socket.

d. Tighten indicator cap by turning it clockwise.

5-5. Replacement of POWER DC FAULT indicator Lamp

Remove and replace the lamp as follows:

a. Unscrew indicator cap by turning it counterclockwise.

b. Remove lamp from indicator cap.

c. Install replacement lamp (MS25237-327, NSN 6240-00-155-7836) into indicator cap.

d. Tighten indicator cap by turning it clockwise.

5-6. Replacement of Fuse

Remove and replace the fuse as follows:

a Unscrew fuse cap by turning it counterclockwise.

b. Pull defective fuse out of fuse cap and insert a replacement fuse.

c. Reinstall replacement fuse (F02B250V1A, NSN 5920-00-284-9220) and fuse cap and tighten by turnning clockwise.

5-7. Minor Repair of Cables

Repair minor cuts in cable insulation by covering it first with insulation tape, and then with plastic tape. If a cable is broken, ship defective cable to higher categw ry of maintenance for repair.

5-8. CHAL AUX MOD DLY Knob Adjustment

If delay between main rf output and auxiliary output is not 0.2 μ sec when control is set to detent, proceed as follows:

a Connect test set and oscilloscope to 115 vac power source.

b. Connect test set up as shown in figure 2-3 and set oscilloscope controls as described in table 2-2 except as follows:

A VOLTS/DIV	0.2
EXT 10/EXT/INT/LINE	EXT
MAIN TIME/DIV	.1 μ SEC

c. Adjust test set controls as described in table 2-3 except as follows

MEASUREMENT FUNCTION SELECT switch	PRF CHAL
SCOPE TRIG/FREQ MEAS DELAY (USEC) controls	Adjust to locate first challenge pulse

d. Adjust SCOPE TRIG/FREQ MEAS DELAY (USEC) MULT control to reference leading edge of first pulse at center of Oscilloscope graticule.

e. Connect RF IN/OUT AUX jack to LOW PWR MEAS IN jack.

f. Adjust CHAL AUX MOD DLY control to detent position.

g. Loosen setscrews and hold knob so that ball plunger remains seated in detent.

CAUTION

Make sure ball plunger housing does not scrape front panel when knob is rotated.

h. Insert flat-bladed screwdriver into hold in center of knob and without disturbing position of knob, adjust control until leading edge of first challenge pulse occurs 0.2 μ sec after position referenced in *d* above.

i. Retighten setscrews.

j. Reconnect RF IN/OUT MAIN jack to LOW PWR MEAS IN jack and check to see that first pulse is still properly referenced at center of graticule then with CHAL AUX MOD DLY control set at detent, check to see that pulse of RF IN/OUT AUX jack is 0.2 μ sec after pulse at RF IN/OUT MAIN jack.

5-9. Knob Replacement

All knobs are replaceable as part of organizational maintenance. The following procedures are used for replacing knobs.

a. Single Control Knobs (Except CHAL AUX MOD DLY Knob).

(1) Loosen two setscrews and remove knob from control shaft.

(2) Place replacement knob on shaft.

(3) Align pointer away from flat on control shaft and tighten setscrew opposite pointer. Then tighten other setscrew.

b. CHAL AUX MOD DLY knob replacement.

(1) Loosen two setscrews and remove knob and ball plunger from control shaft.

(2) Install ball plunger into replacement knob.

(3) Install replacement knob on control shaft.

(4) Adjust control as described in paragraph 5-8.

c. *Dual Knob Replacernent*

(1) Loosen two setscrews of smaller knob.

(2) Remove smaller knob from control shaft.

(3) Loosen two setscrews of larger knob.

(4) Remove larger knob from control shaft.

(5) Install replacement for larger knob on control shaft as described in a(2) and (3) above.

(6) Install replacement for smaller knob on control shaft as described in a (2) and (3) above.

APPENDIX A
REFERENCES

DA Pam 310-4	Index of Technical Publications: Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders
DA Pam 310-7	U. S. Army Equipment Index of Modification Work Orders
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 11-6625-654-14	Operator's, Organizational, DS, and GS Maintenance Repair Parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) for Multimeter AN/USM-223
TM 11-6625-1703-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual Including Repair Part and Special Tool Lists Oscilloscope AN/USM-281A
TM 38-750	The Army Maintenance Management System (TAMMS)
TM 740-90-1	Administrative Storage of Equipment
TM 750-244-2	Destruction of Electronics Materiel to Prevent Enemy Use.

APPENDIX B
COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists integral components of the AN/APM-305A to help you inventory items required for safe and efficient operation.

B-2. General

This Components of End Item List is divided into the following sections:

a Section II. Integral Components of the End Item These items, when assembled, comprise the AN/APM-305A and must accompany it whenever it is transferred or turned in. The illustrations will help you identify these items.

b. Section Ill Basic Issue Items. Not applicable.

B-3. Explanation of Columns

a. Illustration This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration on which the item is shown.

(2) Itern *number. The* number used to identify item called out in the illustration.

b. National Stock Number. Indications the National stock number assigned to the item and which will be used for requisitioning.

c. Description Indicates the Federal item name and, if required, a minimum description to identify the item. The part number indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items. Following the part number, the Federal Supply Code for Manufacturers (FSCM) is shown in parentheses.

d. Location The physical location of each item listed is given to this column. The lists are designed to inventory all items in one area of the major item before moving on to adjacent area.

e. Usable on Code Not applicable.

f. Quantity Required (Qty *Reqd).* This column lists the quantity of each item required for a complete major item.

g. Quantity. This column is left blank for use during an inventory. Under the Rcvd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item.

SECTION II INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION PART NUMBER	(3) (FSCM)	(4) LOCATION	(5) USABLE ON CODE	(6) QTY REQD	(7) QUANTITY RCVD	(7) QUANTITY DATE
1-1	1		TEST SET COVER, MX-9944/APM-305 152050	(45413)			1		
1-1	2		TEST SET TRANSPONDER TS-3395A/APM-305 152100	(45413)			1		
1-1	3		ATTENUATOR, 30DB 134645-2	(45413)	INSIDE TEST SET COVER		1		
1-1	4		CABLE ASSY, RF 139528	(45413)	INSIDE TEST SET COVER		1		
1-1	5		ATTENUATOR, 15DB 134645-1	(45413)	INSIDE TEST SET COVER		1		
1-1	6		CHART, CONVERSION RF 151944-1	(45413)	INSIDE TEST SET COVER		1		
1-1	7		ADAPTER C TO N UG-565 A/U	(80058)	INSIDE TEST SET COVER		2		
1-1	8		TERMINATION, FEEDTHRU, 75 OHM 134646-1	(45413)	INSIDE TEST SET COVER		2		
1-1	9		TERMINATION, FEEDTHRU, 93 OHM 134646-2	(45413)	INSIDE TEST SET COVER		1		
1-1	10		CABLE ASSY, VIDEO 139527	(45413)	INSIDE TEST SET COVER		4		
1-1	11		CABLE ASSY, RF 139526	(45413)	INSIDE TEST SET COVER		2		
1-1	12		CABLE ASSY, POWER AC 139529	(45413)	INSIDE TEST SET COVER		1		

APPENDIX D
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

D-1. General

This appendix provides a summary of the maintenance operations for the AN/APM-305A. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

D-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

D-3. Column Entries

a *Column 1, Group Number.* Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. *Column 3, Maintenance Functions.* Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category Column 4 specifies, by the listing of a'' work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of task-hours specified by the" work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance

allocation chart. Subcolumns of column 4 are as follows:

C - Operator/Crew
O - Organizational
F - Direct Support
H - General Support
D - Depot

e. *Column 5, Tools and Equipment.* Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

D-4. Tool and Test Equipment Requirements (see III)

a. Tool or Test EQuiprnent Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. *Maintenance Category. The codes* in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NAZU Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. *Tool Number. This* column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

D-5. Remarks (see IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

(Next printed page is D-3)

SECTION II MAINTENANCE ALLOCATION CHART
FOR
TEST SET, TRANSPONDER SET AN/APM-305A

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT.	(6) REMARKS
00	TEST SET TRANSPONDER AN/APM-305A	Inspect		0.1				None	
		Test		0.2				1, 3	
		Replace		0.1				None	
		Repair		0.2				2	A
01	TEST SET, TRANSPONDER TS-3395A/APM-305A	Inspect		0.1				None	
		Test		0.2				3	
		Repair		0.1				2	B
		Test				0.5		1 thru 40	
0101	PRF GENERATOR (151955)	Test				0.2		3, 7	
		Replace				0.1		2	
		Repair					1.0	3, 7, 20	
0102	DELAY TRIGGER (151960)	Test				0.2		3	
		Replace				0.1		2	
		Repair					1.0	3, 20	
0103	CLOCK AND TRIGGER LOGIC (151965)	Test				0.2		3, 7, 9	
		Replace				0.1		2	
		Repair					1.0	3,7,9,20	
0104	CHALLENGE AND WORD A/B COUNTER (151970)	Test				0.2		3, 9	
		Replace				0.1		2	
		Repair					1.0	3, 9, 20	
0105	CHALLENGE AND WORD A/B ENCODER (151975)	Test				0.2		3, 9	
		Replace				0.1		2	
		Repair					1.0	3,9,20	
0106	VARIABLE PULSE POSITION AND TIMING MARKERS (151980)	Test				0.2		3, 9	
		Replace				0.1		2	
		Repair					1.0	3, 9, 20	
0107	ISLS DELAY AND SHAPERS (151985)	Test				0.2		3, 9	
		Replace				0.1		2	
		Repair					1.0	3,9,20	
0108	MODE 4 INTERFACE AND BIT (151990)	Test				0.2		3, 9	
		Replace				0.1		2	
		Repair					1.0	3,9,20	
0109	SWEEP GENERATOR AND TIMING MARKERS (151995)	Test				0.2		3	
		Replace				0.1		2	
		Repair					1.0	3, 20	
0110	PEAK POWER VIDEO AND PRF (151910)	Test				0.2		2,7,11,12, 13	
		Replace				0.1		2	
		Repair					1.0	3,7,20	
0111	EXTENDER BOARD ASSY (151845)	Test				0.2		1	
		Repair				0.3		2	
0112	RF GENERATOR (151774-2)	Test				0.2		3,7,8,11	
		Replace				0.1		2	
		Repair					1.0	3,7,8,20	
	FILTER/AMPLIFIER (60 MHz) (134833-1)	Test				0.1		3	
		Replace				0.1		2	C
0113	RF BIT/MIXER ASSY (151930-2)	Test				0.2		3,7,8	
		Replace				0.1		2	
		Repair					1.0	3,7,8,19	
0114	MODULATOR, DUAL SIGNAL GENERATOR (151940)	Test				0.2		3,11,14	
		Adjust				0.2		11,14	
		Repair					1.0	3,10,19	
0115	DETECTOR AMPLIFIER (151945)	Test				0.2		3	
		Replace				0.1		2	
		Repair					1.0	3, 19	

SECTION II MAINTENANCE ALLOCATION CHART
FOR

TEST SET, TRANSPONDER SET AN/APM-305A

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
	VARIABLE ATTENUATOR (134832-1)	Test				0.2		11	C
		Replace				0.2		2	
	ATTENUATOR 6 DB (134835-1)	Test				0.2		11	C
		Replace				0.2		2	
	DUMMY LOAD (134213-005)	Test				0.1		1	C
		Replace				0.1			
	MULTICOUPLER ASSY (151835)	Test				0.2		11	
		Replace				0.2		2	C
	COUPLER, 9 DB DIRECTIONAL (151843)	Test				0.2		11	C
		Replace				0.2		2	
0116	POWER SUPPLY ASSY (151920)	Test				0.2		3,5,6	
		Replace				0.4		2	
		Repair					1.0	3,5,6,18	
011601	CIRCUIT CARD ASSY (PS1A1)	Test					0.2	3,5,6,20	
		Replace					0.1	2	
		Repair					1.0	3,5,6,20	
	SWITCH, RF TRANSMISSION LINE (134836-1)	Test				0.1		11	C
		Replace				0.3		2	
0117	PANEL AND CHASSIS ASY (NO PART NO.)	Test				0.2		1	C
		Repair				0.3		2	
	CIRCULATOR RF HY1 (134302-1)	Test				0.2		11	C
		Replace				0.2		2	
02	COVER TEST SET MX-9490/APM-305A	Inspect				0.1		None	
		Repair				0.3		2	
	ADAPTER UG-565A/U	Test		0.1				1	C
		Replace		0.1				None	
	ATTENUATOR, 15DB (134645-1)	Test		0.1				1	C
		Replace		0.1				None	
03	CABLE ASSY, POWER (139529)	Test		0.1				1	
		Repair		0.2				2	
04	CABLE ASSY, RF (JUMPER) (139528)	Test		0.1				1	
		Repair		0.2				2	
05	CABLE ASSY, VIDEO (139527)	Test		0.1				1	
		Repair		0.2				2	
06	CABLE ASSY, RF (139526)	Test		0.1				1	
		Repair		0.2				2	
	ATTENUATOR 30 DB (134645-2)	Test		0.1				1	C
		Replace		0.1				None	
	TERMINATION FEEDTHRU 75Ω (134646-1)	Test		0.1				1	C
		Replace		0.1				None	
	TERMINATION FEEDTHRU 93Ω (134646-2)	Test		0.1				1	C
		Replace		0.1				None	

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
'TRANSPONDER SET, TEST' SET AN/APM-305A

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE		NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O,H	Multimeter	AN/USM-223	6625-00-999-7465	
2	O,H	Tool Kit Electronic Equipment	TK-105/G	5180-00-610-8177	
3	O,H,D	Oscilloscope	AN/USM-281C	6625-00-106-9622	
		or			
		Alternate			
		Oscilloscope	AN/USM-281A	6625-00-228-2201	
4	H	Transformer, Variable Power	CN-16/U	5950-00-235-2086	
5	H,D	Voltmeter, Differential	ME-202B/U	6625-00-972-4046	
6	H	Multimeter	ME-26B/U	6625-00-913-9781	
7	H	Counter, Electronic Digital Readout	AN/USM-207	6625-00-911-6368	
8	H	Comparator, Frequency	CM-77( )/USM	6625-00-080-7204	
9	H	Generator, Electronic-Marker	AN/USM-108( )	6625-00-987-9564	
10	H,D	Generator Set, Pulse	AN/UPM-15A	6625-00-682-2581	
11	H	Test Set, Radio Frequency Power	AN/USM-260	6625-00-892-5541	
12	H	Generator, Signal	AN/USM-213	6625-00-872-3215	
13	H,D	Calibrator Set, Pulse Power	AN/UPM-73( )	6625-00-830-0358	
		or			
		Alternate			
		Log/Lin RF Peak Power Meater	Pacific Measurements 1018A		
14	H	Detector, Radio Frequency	RF-210/U	6625-00-935-0086	
15	H	Receiver-Transmitter	RT-859A/APX-72	5895-00-068-1555	
16	H	Test Set, Transponder Set	AN/APM-239A	6625-00-802-7425	
17	D	Oscilloscope, Tektronic 7603		None	
18	D	Spectrum Analyzer Plug In	TEK 7L12 and 7A18	None	
19	D	High Frequency Plug In	Tektronic 7A11 and 7B53A	None	
20	D	Sweep Signal Generator	HP 8620 and 86220A	None	
21	D	Signal Generator	HP 8614A	None	
22	D	Video Detector HP 423B and 11523A		None	
23	D	RF Counter HP 5328A with Option 031		None	
24	D	Pin Modulator	HP 8714	None	
25	D	10dB Directional Coupler		None	
26	D	RF Generator TE No. 151774-2		None	
27	D	Power Supply Test Station		None	
28	D	RF Device Test Station		None	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	Repair is limited to repair of cables, replacement of attenuators, adapters, lamps, fuses or knobs.
B	Repair is limited to replacement of lamps, fuses and knobs.
C	Non-repairable item

APPENDIX E
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. Scope

This appendix lists expendable supplies and materials you will need to operate and maintain the AN/APM-305A. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. Explanation of Columns

a. Column 1—Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, app. D").

b. Column 2—Level. This column identifies the lowest level of maintenance that requires the listed item.

C—Operator/Crew
O—Organizational Maintenance
F—Direct Support Maintenance
H-General Support Maintenance

c. *Column 3-National Stock Number.* This is the National stock number assigned to the item; use it to request or requisition the item.

d. *Column 4-Description* Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. Column 5-Unit of Measure (U/M.). Indicates the measure used in performing the actual maintenance function. This measure is expressd by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS
1		5350-00-235-0124	FINE SANDPAPER NO. 000	
2		8305-00-267-3015	CLEAN, DRY, LINT FREE CLOTH	
3		8020-00-260-1306	SOFT BRISTLE BRUSH	
4			CLEANING COMPOUND (TRICHLORENTHANE)	
5			PAINT (FILM E SEMIGLOSS, LIGHT GREY ENAMEL) MIL-F-14072	
6		6625-00-205-6513	ISOPROPYL ALCOHOL	
7			INK, MARKING (FLAT BLACK) (45413-134021)	

By Order of the Secretary of the Army:

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USACIS (3)
USAADS (2)
USAFAS (2)
USAARMS (2)
USAIS (2)
USAES (2)
HISA (Ft Monmouth) (33)
Fort Gillem (10)
Fort Gordon (10)
Fort Huachuca (10)
Fort Carson (5)
Ft Richardson (CERCOM Ofc) (2)
AD (1) except
  SAAD (30)
  LBAD (14)
  TOAD (14)
  SHAD (3)
USA Dep (1)
Sig Sec USA Dep (1)
MAAG (1)
USARMIS (1)
USAERDAA (1)
USAERDAW (1)
Units org under fol TOE:
  29-134 (1)
  29-207 (2)
  29-610 (2)
  44-536 (1)
  55-457 (1)

ARNG & USAR: None.

For explanation of abbreviations used, see AR 310-50.

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE
TM 11-5825-261[illegible]-12	5 Jan 78	

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

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